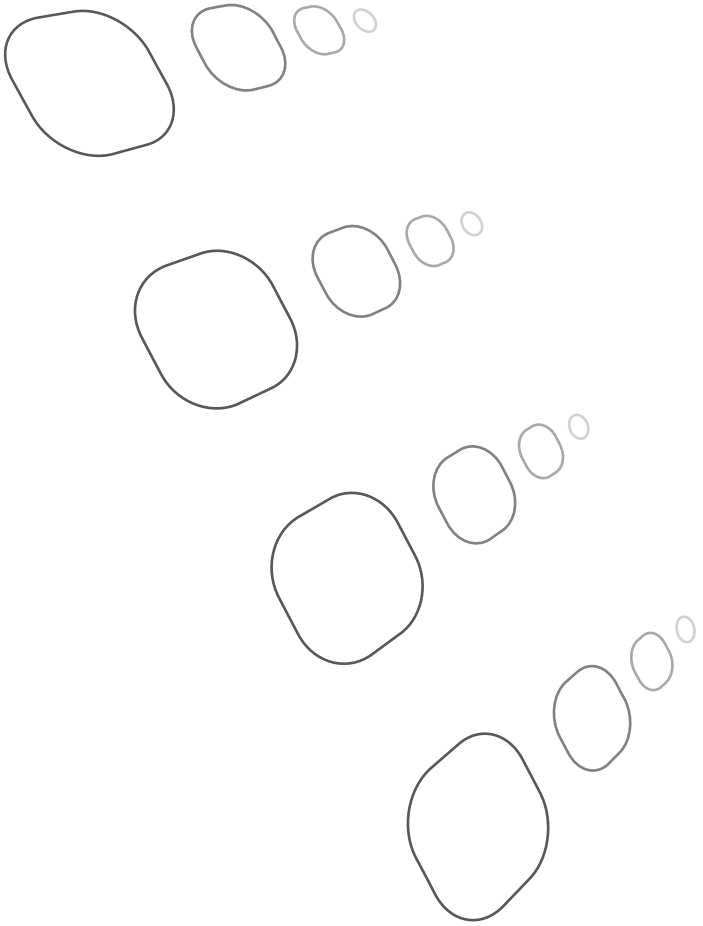

Grading

User Guide

Version 5.2

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Symbols

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Information: Additional hardware or software information which may be useful.

Tips: Useful hints and advice when undertaking tasks.

Notes: System, software and workflow points to consider and remember.

See: Reference to other items in this document or in other documents.

Text

<Text> in these brackets represents a specific key press on the keyboard.

Text in italics represents a menu function or an option. An upper case first letter indicates a main menu and a lower case first letter indicates a sub-menu.

Text in bold represents a function or OLED selection on a Quantel panel.

NN This indicates a value entered on a numeric keypad.

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About This Manual

This guide covers Quantel's colour functions plus corresponding panel functions. It may cover options not available on the system you are using.

This guide was written and published by Quantel. The bottom of each page displays the guide's reference number, eg **2116-59-040** plus a revision letter eg **E** ('E' being more recent than 'A' which is the original). The publish date is also indicated in the format **mm/yy.** If you require hard copies of a guide, always quote its reference number, revision letter and title.

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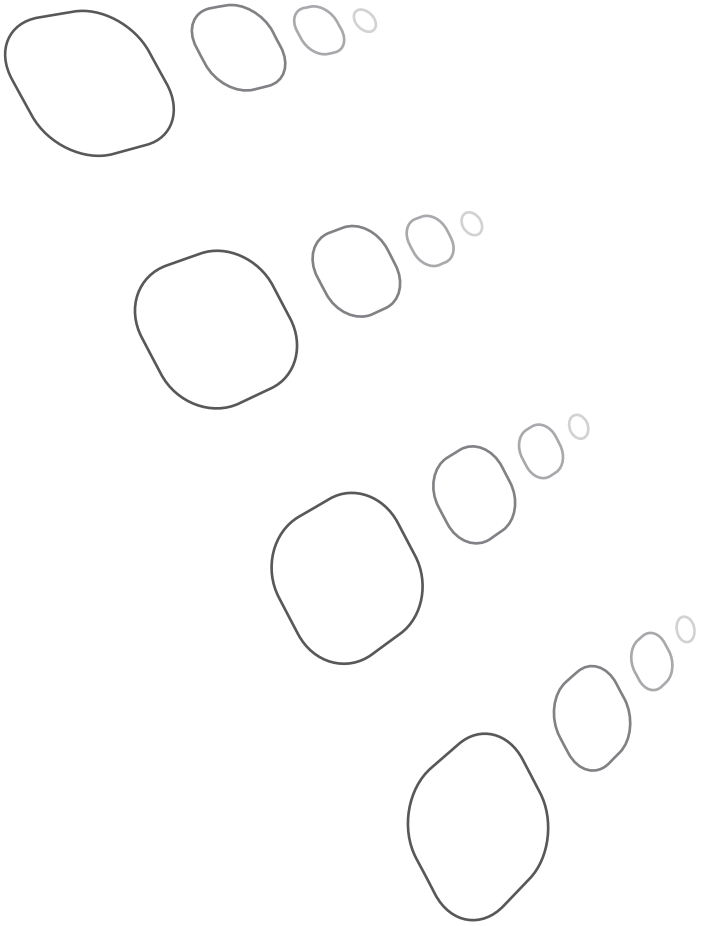


1

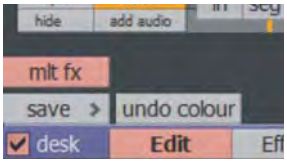
MLT FX – Colour

The Edit application's *MLT FX – colour* menu enables you to easily undertake primary and secondary corrections in a multilayer timeline environment.

You can grade and preview media directly on the 2D or 3D multilayer timeline.

Overview

Introduction



The Edit application's *mlt fx – colour* menu enables you to easily undertake primary and secondary corrections on a 2D or 3D multilayer timeline. You can colour correct either individual clip segments, video tracks or the whole timeline.

You can perform primary (ie overall) and secondary (ie specific) keyframed corrections on clip segments as well as cascaded correction using unlimited levels. Specific colours can be easily matched or manipulated by using GUI swatches and HSL, YUV and RGB graphs. Storyboards and Stillstores can then be used to store, compare and transfer required process parameters to other projects.

This chapter details the *colour* process in MLT FX. Ensure that you are familiar with other MLT FX processes and timeline functions beforehand by referring to the MLT FX User Guide and the Editing User Guide. For Stereo3D MLT FX functions, see the Stereo3D User Guide.

Opening MLT FX

Press the *Edit* tab on the Application Bar to open the Edit application then open an edit or assemble 2D and/or 3D material on the multilayer timeline as required.

Select *mlt fx* in the bottom-left of the menu area followed by *colour,* (on a new timeline, this should appear automatically at the top of the process list). All the primary and secondary grading functions are now displayed in the area on the right.

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Panel Interaction with MLT FX

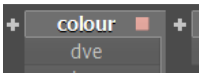
The NeoNano or the Neo panel can be used in conjunction with Edit and MLT FX. The panel functions interact with the GUI where applicable.

See chapter 2 for NeoNano functions; see chapter 3 for Neo panel functions.

Using the Process Stack

Note that *colour* is the top process in the stack in MLT FX and its functions display by default. Press on any other process box (eg *dve*) to display its associated functions to the right.

Enable or Disable a Process



If a change is made within a process, the name displays a small box to the right with a pink highlight.

To toggle the original ungraded media with the current layer's grade, press the small square box to the right of '*colour'* (you can toggle other processes like this). You can also do this for any associated function, eg to toggle *colour – revolver* parameters on/off, press the box next to '*revolver'*.

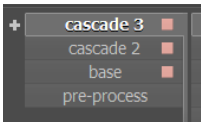
Duplicate a Process

Press on the required process box, eg *colour*, then hold down <Shift> and slide the cursor up to create a copy of the process and its settings (*colour 2* in this example).

Add (+) & Name a New Process, Shape or Cascade

Add a new process by pressing the '+' box to the top-left of the process stack then selecting a process via the pop-up. The new process now transfers to the stack with a number (eg *colour 2, colour 3* etc). A scroll bar may appear as the stack becomes longer. Double-click on the new item's name and enter a new name in the soft keyboard if required.

In processes with shapes (*graphics, blur, colour, key*), you can add a new shape by pressing '+' to the left of the new shape stack. Press '+' again to toggle between the existing shape stack and the new shape stack.



You can add a new cascade level in the *colour* or *full key* menu by pressing '+' to the left of the cascade stack.

Re-order a Process, Shape, or Cascade

Re-order a process by dragging and dropping a name box (eg *dve*) up or down the stack (the top process is the last process applied). You can also do this to move a cascade within the cascade stack, or to change the level of shapes on-screen by dragging the shape's name up or down through the stack. The shape at the top of the stack is placed in front of other shapes on-screen and the shape at the bottom is behind the others.

Delete a Process, Shape or Cascade

Press *delete* on the left of the menu area followed by the item name in the stack to delete it, together with any keyframes. You can only delete copies or new items. Note that valid items display a red outline when you press *delete* then move the cursor over them.

Reset a Process or Function

Select *reset* in the GUI, then press a roller ball, menu function (eg *revolver*) or a value to reset it to the default on the current track/segment. All keyframes remain in position. Note that valid items display an orange outline when you press *reset* then move the cursor over them.

Stereo3D Processes

With stereo timeline media, each process (except the stereo process itself) has two square boxes for the left and right eyes. If you do not select a box, the process is applied to both eyes.

A light-grey box indicates which eye has focus (ie is enabled); check this is correct before applying the process. Press a dark-grey box to switch focus to the other eye, or press a light-grey box to enable both eyes.

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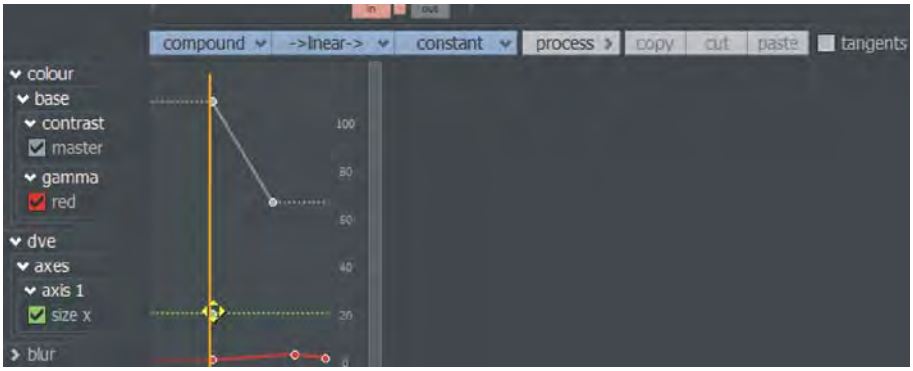
When you have made a process change, you can hold down a dark-grey box to move the process to the other eye, or hold down a pink box to apply the process to both eyes.

The Edit Window is split between left and right eyes. You can use the eye selectors (*L* and *R* boxes) below this window to toggle between different views. Both eyes are on by default (ie pink).

See 'Stereo3D User Guide' for more details.

Using Keyframes for Dynamic Grades

In MLT FX there is a set of keyframe curves for each clip segment, for the whole track, and for the whole timeline.



Keyframes appear for each clip segment after a process parameter (eg colour) is changed. Parameters that define the change between each keyframe can then be adjusted using graphs if required. These graphs display the rate of change of each parameter value (eg size, position, colour etc) against time.

Opening the Graph

Open the graph by right-clicking (<Alt> + tap for pens) or dragging-up the yellow dividing line between the timeline and the process menu area. This also determines the vertical scale of the graphs. Right-clicking again returns the graph to its default position.

Zooming & Viewing the Graph

Tapping on the timeline ruler expands the current clip segment to fill the width of the screen; this allows graphs to be adjusted more accurately.

A white bar appears on the timeline ruler to allow scrolling along the whole timeline. Tapping on the white highlight of the timeline ruler returns the display to match the width of the clip segment.

The display of parameters is hierarchical allowing them to be collapsed if required. All keyframes can be seen either altogether, in groups, or individually for each process (eg *dve*). There are 3 modes for viewing the keyframes which can be selected from the blue scroll box.

Parameter curves can be hidden by deselecting the corresponding tick box on the left of the graph area. Pressing and holding down on the parameter name toggles a solo view on/off.

Creating & Editing Keyframes

If you tick the *auto* box, a keyframe node is inserted automatically whenever a parameter is changed. If *auto* is deselected, confirmation is required before any node is inserted. Do this by pressing the orange *edit* box that appears.

With the *auto* box ticked, a parameter change automatically creates a keyframe of the new parameters indicated by a node appearing on the graph. Transitions between the nodes are interpolated on rendering. Nodes are different colours for each parameter – although nodes change to yellow if the *tangents* check box is selected or if a node is selected.

1. To set an initial keyframe (ie start point) for a process, select the required timeline point where you want to start the change

2. Use the process parameter boxes to make the change (eg *colour – primary*)

3. If required, select another frame and make another change within this process, then repeat as necessary, or simply move to the frame you want to finish on and make the final change.

You can also insert a keyframe by pressing on the required position on the graph. The timeline cursor moves to this position and the parameter value can

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now be changed using the green numeric boxes or by dragging the node or curve (with *tangents* on) in the graph display.

When transferring colour settings, you can press *insert edit* before dropping the setting onto the image area. This applies only the last keyframe values in the settings clip (eg those for *lift*, *gamma*, *gain*) to the current clip at the cursor position. This is useful if you need to transfer the same colour values from the end of one clip to the start of the next. If *insert edit* is not pressed, all the keyframe values (and not just the last) are transferred to the clip regardless of cursor position.

Selecting & Moving Nodes

Any existing keyframe can be selected then edited by stepping to it using the ← and → boxes (or <Ctrl> + <←> or <→> on the keyboard) then making the required process changes. The keyframe can also be edited using parameter graphs by directly selecting nodes on the parameter's keyframe curve.

Select multiple nodes by dragging a lasso (yellow box) around them. You can select or deselect nodes individually by holding down the <Ctrl> key + tapping on them. This makes it much easier to isolate keyframe nodes for moving or copying.

Move a node by placing the cursor on it then dragging it up/down or left/right. This increases or decreases the value for the selected parameter at the current keyframe. The curve between the nodes changes accordingly to provide the best interpolation between all keyframes.

Deleting & Copying Nodes

Press the *delete* box in the top-left of the process menu area followed by tapping on the node you want to delete. Alternatively, drag a lasso around the nodes you want to delete then press *delete*. If you press *delete* then tick *keyframe* followed by *all*, all the nodes except the current one are deleted.

When you select nodes, the *cut* and *copy* boxes highlight. Choose one of these boxes, then move the timeline cursor to another frame and transfer the cut/copied nodes by pressing the *paste* box.

Grouping Nodes

Groups of keyframe nodes on the graph can be selected (by dragging a lasso around them) and then all moved by the same amount using the box cursor around the lassoed area.

Moving the left or right edges of the yellow box cursor moves the keyframes earlier or later in the parameter effect while the node closest to the opposite edge remains fixed. Moving the top and bottom edges of the yellow box cursor increases or decreases the rate of change between the keyframes while the node closest to the opposite edge remains fixed.

Modifying the Curve (Tangents)

When the *tangents* box is ticked, the nodes turn yellow and 3 coloured lines emanate from the node with a 'handle' on each end. Drag a handle to change the shape of the curve (and therefore how smooth the transition is) as follows:

Drag the yellow line's handle to change the curve entering and exiting the current node; drag the pink line's handle to change the curve entering the node; drag the red line's handle to change the curve exiting the node.

See MLT FX User Guide for full details of viewing and editing keyframe graphs.

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Applying Colour Cubes

1D & 3D LUT Overview

LUTs (Look Up Tables) consist of data files containing input and output values for red, green and blue that emulate a specific display system. They are used either before grading, for monitor callibration, or to preview the final image output accurately. You can use a 1D or 3D LUT:

1D LUT	Maps the input values of a single RGB component to new values for that component and is useful for basic corrections of gamma, brightness, contrast etc. You can select, modify and save any 1D LUT into the C:\Data\User\Luts folder.
3D LUT ('Colour Cube')	Generally provides finer and more complex correction than a 1D LUT as one RGB component's input value can affect the other two components. You can select, modify and save any cube into the C:\Data\User\Cubes folder.

Using Cubes

Quantel's 'Cube Builder' allows you to create, modify, save then 'burn-in' and/or view the cube on output. You can use different cubes on different segments and use them with log or linear media in RGB or YUV (all cubes are RGB but convert for YUV media). Each cube can be saved locally as a text file (.txt) in the C:\Data\User\Cubes folder. You can also use IRIDAS 'look' (.look) files then modify/re-save them as text files.

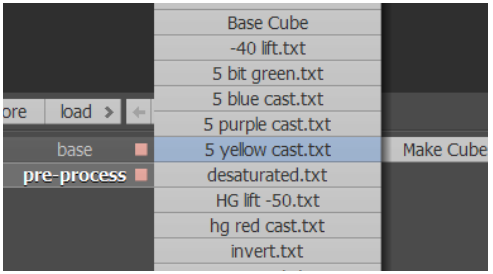
You may want to apply a cube to media **before grading**, eg on a tape based deliverable; the cube effect appears in the GUI display and SDI output during the subsequent grade. Use the *pre-process* level at the bottom of the GUI Cascade stack to apply/create a cube before grading; this cube is then 'burnt-in' when the material is rendered.

Alternatively, a cube such as 'FilmLook' can be applied on output **after grading**, eg on a film deliverable; the cube effect appears on the SDI output only. This cube can then be 'burnt-in' (eg when the material is exported via the I/O application etc).

When creating a cube to be used for FilmLook or I/O – Export, you can avoid confusion by disabling FilmLook on output. Do this by deselecting *lut* on the Application Bar (this toggles the live LUT).

See Appendix for details of modifying FilmLook parameters.

Pre-process – Applying or Removing an Existing Cube



Press the *pre-process* box then select an existing cube from the scroll box on the right.

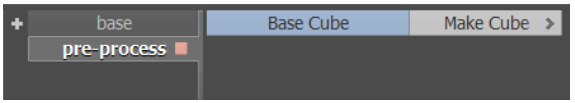
This cube's effect is now visible on the current timeline selection (ie segment, track or clip).

To display no cube, select the empty entry from the scroll box list.

You can apply all the current cube's values to a new cube. Modify any colour parameters on the *base* Cascade if required, then press *Make Cube* and rename it via the soft-keyboard.

Pre-process – Creating a New Cube

Linear RGB or YUV Media



Note that only changes to the *base* Cascade are saved in the new cube.

1. Press the *pre-process* box and select *Base Cube* from the scroll box on the right.

2. Use the *colour* function's primary/secondary tools to set parameters as required for the new cube (if necessary disable the live output LUT by pressing the *lut* box on the Application Bar).

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3 Press *Make Cube* then rename it via the soft-keyboard.

4 Reset the *colour* process. Press *pre-process* and scroll to the new cube. The cube effect now appears in the GUI display and SDI output. Note that *colour* process parameters for the cube are not indicated in the GUI; all functions display their defaults.

The resultant cube can be loaded, modified and exported via the I/O application.

Log Media (DMin/Dmax Menu)

The *DMin/DMax* cube appears automatically in the scroll box only if the clip has log data.

Tick *Convert* to convert log-based material to a linear image.

Although rarely used, at any time you can specify the RGB adjustment range by setting the minimum and maximum density in the *Dmin* and *Dmax* boxes. Note that the default values correspond with the *RGB Dmin* and *RGB Dmax* values in the <F1> Configuration Window's *Colour* menu. The minimum value of 95 represents the default black point; the maximum value of 685 represents the default white point.

If there is an imbalance, tick *RGB* then enter separate values for red, green and blue.

These settings are retained when you make a subsequent cube then save it, as described previously for linear material.

When processing log material without a cube applied, operation is as follows:

a Log media is converted to linear referencing the *DMin/DMax* values. This is necessary for any colour corrector as the colour maths cannot be applied to log data successfully: the values change but the effect is not correct.

b The colour correction process is applied (lift, gamma, gain, hue etc).

c If *convert* is off, the final output of the correction is converted back to log

media using the same *DMin/DMax* values as the original conversion.

d If *convert* is on, the final output remains as linear media, specified by the *DMin/DMax* values.

When a cube is applied to log material, operation changes as follows:

a Log media is converted through the cube to the cube designer's colour space.

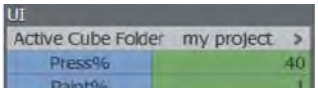
b *DMin/DMax* values are not applicable and are hidden.

c As the designer's colour space conversion cannot be predicted, you cannot convert back to log and maintain accuracy, so the result of any additional colour correction is applied on top of the cube correction and the resultant media is saved to disk.

Selecting the Active Cube Folder

For easier management of cubes in the C:\Data\User\Cubes folder, you can organise them separately in different project folders and sub-folders and set a folder as the target for subsequent cubes:

1 In Windows, create multiple folders as required in C:\Data\User\Cubes.



2 Open the <F1> Configuration Window and select *Active Cube Folder* in the *UI* menu.

3 Enter the folder name, eg 'my project' and close the <F1> window.

The folder you select in the <F1> Configuration Window now becomes current when using and saving cubes. If you want to make a sub-folder current, you should enter '\\' before the sub-folder entry; eg 'my project\\project 4' selects the 'project 4' sub-folder within the 'my project' folder.

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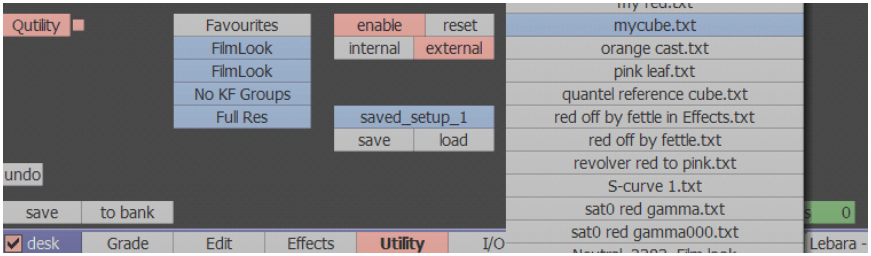
Selecting & Toggling the Output LUT

This LUT is output to the monitor or tape and does not affect the original media or the Edit Window image.



Any cube from the C:\Data\User\Cubes folder (or sub-folder; see previous section) can be selected for output. There are two ways of selecting and toggling the live LUT:

A Open the Utility application, then select *FilmLook* from the two scroll boxes below *Favourites* (see screen shot). Select the *external* box on the right and choose the cube from the scroll box list. Select *enable* to show the live LUT on the output (this corresponds to the *lut* tick box on the Application Bar).

B Alternatively, you can continue grading within MLT FX and select a new cube from the scroll box list on the Application Bar (this only appears when *lut* is ticked). Press the *R* box on the left to refresh the list.

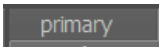
At any time during the grade, press the *lut* tick box on the right to toggle the selected live LUT on or off.

You can also select 1D LUTs from the C:\Data\User\Luts folder.

See Appendix for details of modifying FilmLook parameters.

Primary Grading

Introduction



In *mlt fx – colour,* you can perform primary (ie overall) corrections on clip segments.

The image range consists of lows, mids and highs which can be adjusted independently using lift, gamma and gain controls. Hue, saturation and colour balance can also be altered to simulate a time of day (night, dawn etc) or correct colour cast introduced at the time of filming.

When working on the overall video image, it is advisable to start correcting differential lowlights (ie whether they need to be darkened or lifted) followed by the highlight gain then the midtone gamma. The master hue, balance and general colour of the image can then be considered.

You should frequently check any adjustments against the original ungraded clip and other timeline clips – especially when making very subtle corrections. Do this by pressing the small square *colour* box in the process stack to toggle the current layer's colour process on/off. Perform any primary changes on the *base* (default) Cascade level (see 'Secondary Grading' for more details of using Cascades).

Depending on your workflow, you may want to apply a LUT to media on the *base* Cascade before grading; see previous section for details.

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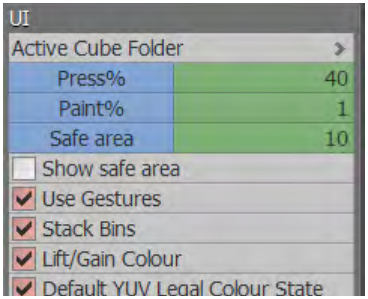
Selecting Colour Mode

<F1> Settings (Lift/Gain Colour)

When the Quantel kernel has been launched, you can choose between two modes which affect the display of the *colour – primary* menu in MLT FX:



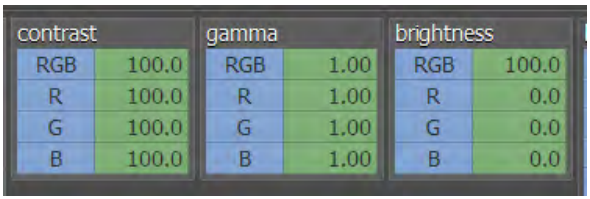
Press <F1> to display the Configuration Window.

In the *UI* menu, tick the *Lift/Gain Colour* box to enable roller balls for lift, gamma and gain (ie 'high/low' mode). Ensure this is ticked (ie the default) if you are using a Neo or NeoNano panel.

If you do not tick *Lift/Gain Colour,* MLT FX displays menus for contrast, gamma and brightness (ie 'classic' mode); see next sections for details of both modes.

Classic Mode

See 'Selecting Colour Mode' in previous section for how to set this mode. The *colour – primary* menu now displays menus for contrast, gamma and brightness (instead of the roller balls and rings in 'high/low' mode).



Use the *RGB* boxes to control master values for contrast, gamma or brightness of the current image. The *R, G* and *B* boxes control the individual R, G and B values.

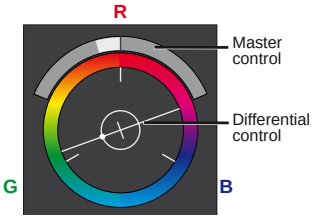
You should not select this mode if you are using a Neo or NeoNano panel, as the panel roller balls and rings will not be available. Other colour functions available in both modes are described in the next section (High/Low Mode).

High/Low Mode

GUI Roller Ball & Ring Functions

See 'Selecting Colour Mode' previously for how to set this mode. The *colour – primary* menu now displays lift, gamma and gain roller balls and rings (instead of the contrast, gamma and brightness menus in 'classic' mode).

All RGB values are displayed as coloured numbers to the right of each roller ball.The roller balls indicate the arrangement of RGB and any adjustments made.



Each roller ball affects colour differential, ie each colour component can be adjusted separately. Moving the left ball via the cursor adjusts the image's lift (shadows); the middle ball adjusts gamma (midtones); and the right ball adjusts gain (highlights).

Each ball has a grey ring over the top. This is the master control; rotating it allows all colour components to be adjusted together.

Deviations from neutral are shown as a white segment on the ring. The grey number to the right indicates the current master value.

Locking Lift & Gain

If you tick the *lock* box in the GUI (in 'master' mode only), lift and gain can be controlled together by using the left roller ball and ring.

Changing Roller Ball Vectors

Tick the *vectors* box to change the angle at which colours are distributed around the roller ball via the pop-up. Colour order from left to right is always green, red then blue.

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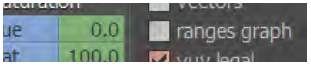
With the top scroll box set to *Low/Mid/High (GRB)* you can set the angle of these colours to either *90˚*; *120˚* for an even distribution; or *VScope* so that colours correspond to a vectorscope graticule.

Alternatively, from the top scroll box, select *Custom Angle* then enter a required angle in the numeric box below.

Setting Custom Ranges via Graph



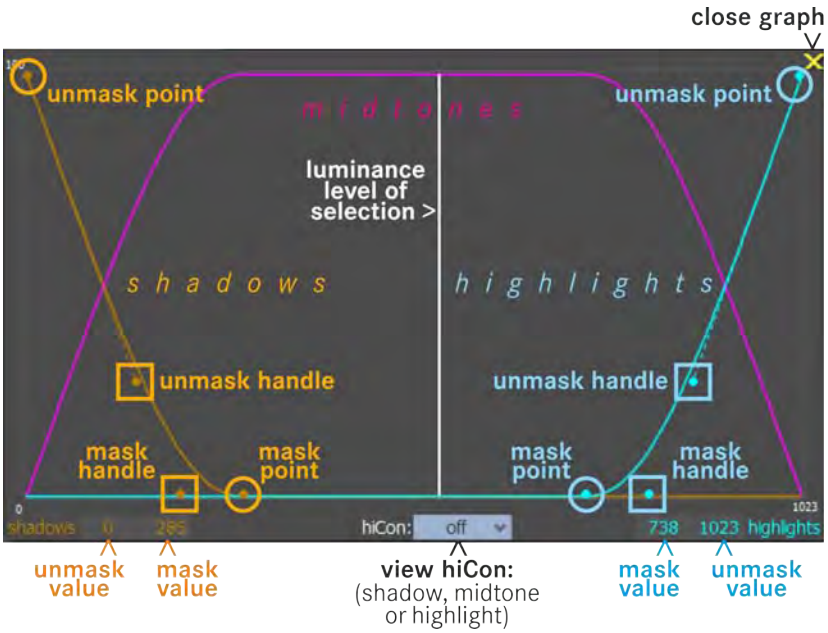
You can define the limits of the lift and gain controls by ticking the *ranges graph* box. A floating graph now appears (see following diagram). To re-position the graph, hold down on a grey area and drag it.

The orange curve on the left affects shadows/lift; the cyan curve on the right affects highlights/gain. The magenta curve indicates midtones/gamma but cannot be moved; it moves automatically depending on the shadow/highlight limits.

There are 2 nodes (dots) on each curve plus 2 node handles (dots with lines). The cursor changes when you move it over a node/handle.

On the orange 'shadows' curve, drag the top-left node left/right to move the unmasked (ie revealed) limit point; alternatively enter a numeric value in the first *shadows* box. Drag the bottom-right orange node left/right to move the masked (ie concealed) limit point; alternatively enter a value in the second *shadows* box. The two dots with dashed lines are handles for each node and can be moved to control the curve through the node; this affects the gradient of unmasked/masked area inbetween and the midtone area.

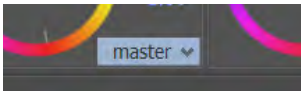
This is similar for the cyan 'highlights' curve, except controls are mirrored on the right of the graph.



A colour's luminance level can be viewed by selecting it on the image in the Edit Window (eg a shadow or highlight). A vertical white bar now appears on the graph which you can slide nodes to for darkening or lightening the image.

Use the *hiCon* scroll box to toggle between high contrast views of shadows, midtones or highlights on the image in the Edit Window.

When you have finished, press 'X' in the top-right corner of the graph to close it.



The GUI roller balls/rings have five different modes related to the range graph settings, which you can select via the scroll box below the gamma ball:

master The default/normal mode (always used in previous software versions).

slimRange Changes ball/ring functionality to affect the combined ranges for shadows, midtones and highlights, as defined by the graph. The left (ring/ball) affects the bottom of the shadow area; the middle

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affects the centre of the midtone area; the right affects the top of the highlights area.

shadow Changes ball/ring functionality to only affect areas of shadow/lift in the image, as defined by the graph. The left (ball/ring) affects the bottom of the shadow area; the middle affects the centre of the shadow area; the right affects the top of the selection.

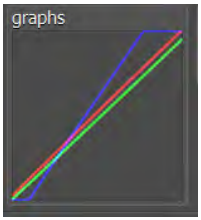
midtone Changes ball/ring functionality to only affect areas of midtones/gamma in the image, as defined by the graph. The left (ball/ring) affects the bottom of the midtone area; the middle affects the centre of the midtone area; the right affects the top of the midtone area.

highlight Changes ball/ring functionality to only affect areas of highlights/gain in the image, as defined by the graph. The left (ball/ring) affects the bottom of the highlight area; the middle affects the centre of the highlight area; the right affects the top of the highlight area.

You can save colour ranges independently of the edit in the Settings Bin, by selecting *ColourRanges* from the bin's *save*> scroll box.

Note that *hue, s-curve* and *balance functions* are not affected by custom ranges.

RGB Graphs & S-curve

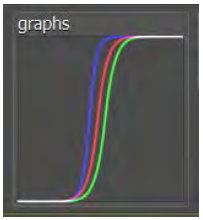


In 'high/low' mode, RGB graphs are available to show how the grade has affected the original input colours. Press on the master RGB graph on the right of the menu area to open individual R, G and B graphs. Press on a graph to return to the master.

There are 3 vector lines representing red, green and blue. The bottom-left of the graph represents the lowlight range for each colour, the middle of the graph shows the midtone range and the top-right represents the highlight range.

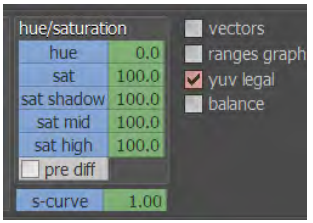
For example, if the *lift* function is performed on the blue value, the blue line on the graph lifts/moves up from the bottom-left corner of the graph (because the blacks and lowlights for this colour on the current image are being affected).

Similarly, a gamma adjustment bends the middle of the red, green and/or blue vector lines (ie affecting the midtones) and a gain adjustment moves the red, green and/or blue lines across from the top-right corner (ie affecting the highlights).



The *s-curve* function allows you to control the toe (shadow area) and shoulder (highlight area) of the curve by changing the value in the box, while fixing the lift, gamma and gain points.

Hue, Saturation & Pre Diff



You can change the hue and saturation of the image by changing the values in the hue/saturation menu. You can also change shadow, midtone or highlight saturation (limits depend on the custom range being used).

If you tick *pre diff,* this switches the sequence in which the colour controls are applied to the image:

pre diff **off** (default)	lift, gamma and gain values are applied before hue, saturation, Revolver and Fettle.
pre diff **on**	hue, saturation, Revolver and Fettle are applied before lift, gamma and gain values.

'Pre diff' can be used to create sepia or duotone effects. Desaturation of an image in standard mode (ie with *pre diff* off) prevents a colour cast being added using the lift, gamma and gain controls. With *pre diff* on, the image can be desaturated before lift, gamma and gain controls are used to add a colour cast.

YUV Legal

Tick the *yuv legal* box to ensure that any rendered clips have legal YUV levels.

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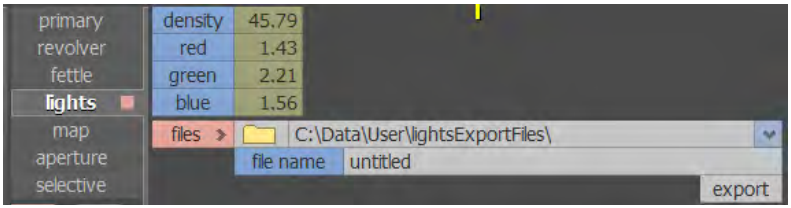
Balance

The *balance* function reduces the colour cast of the image when you select a reference colour on the image in the Edit Window. This colour is then reduced to zero and other RGB lift and gain values shift by relative amounts; these values can then be adjusted more if required.

Lights



The *lights* function (ie 'printer lights') allows you to adjust the level of density (brightness) or red, green and blue. Lights can be set between -50 to +50 on each cascade level and they are also keyframable enabling the lights to change throughout the clip. A negative value increases the cast of a specific colour as lights are relative to negative film.

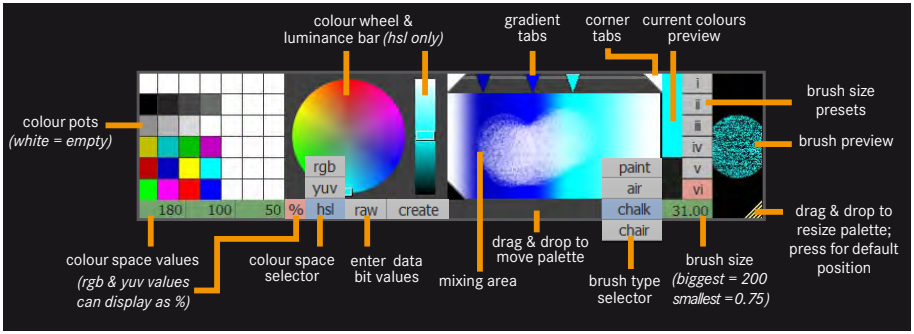
A set of lights can be exported as a text file (.txt) by pressing the *files* > box. A pop-up now appears allowing the destination directory/folder to be selected by pressing the down arrow and a field for entering an appropriate file name; press *export* to export the settings. Note that if lights are keyframed, the text file only contains the current frame value before export.

Map – Colour the Image via Palette

The *map* (colour map) function allows the image to be modified by the Colour Palette mixing area.

For example, if a graduation from black to white is created in the palette, the *map* function can be used to turn the image to monochrome. If the graduation is from white to black (or if the *invert* function is used) the image is transformed into a monochrome negative:

1 Press <F2> on the keyboard to toggle the Colour Palette on and off. Alternatively, tick *Palette Swipe* in the <F1> Configuration Window's *UI* menu to toggle the palette whenever the pen is swiped down or across the tablet.



2 Select the *map* function. Now *from*, *to* and *auto* functions appear on the palette (plus *undo* and *pick* functions on the right). The *from* and *to* functions allow the image to be modified by the contents of the palette mixing area. The left side of the mixing area affects the lowlights of the image and the right side affects the highlights.

3 Create a 2 colour graduation in the palette by dropping a different colour on the top-left and top-right corner tabs (hold down on a tab to load a colour).

4 Press *from.* The image updates with the 2 colours replacing the original low and high values of the image. The *map* process box in the menu area now enables to indicate a colour map. You can press *auto – from* which automatically changes the image whenever a colour is changed.

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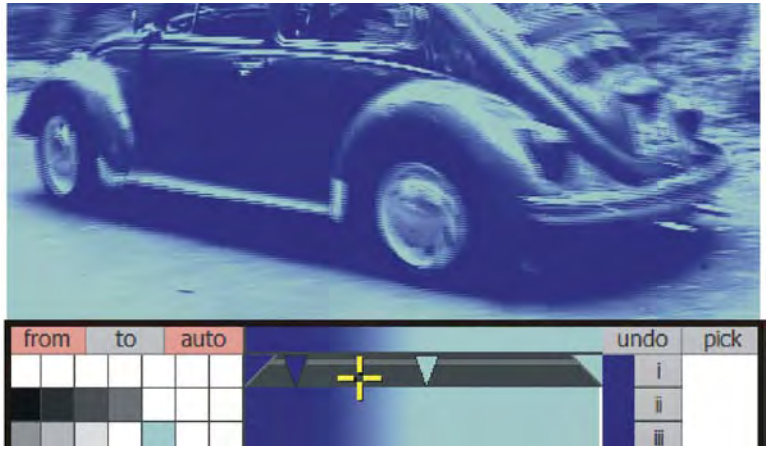


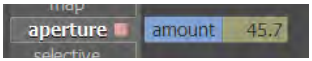
5 Reverse the colours by pressing *map – invert* if required.

6 You can now introduce more colours to affect the midtones of the image by adding gradient tabs along the top of the mixing area and dragging them until the required effect is achieved. You can also paint in the mixing area to create a more contrasting image. Remember to press *from* after introducing each colour (if *auto – from* is not enabled).

7 If you have changed the palette but want to transfer the current map on the image back into the palette, press *to*.

You can use the palette in other processes. See 'Using the Colour Palette' in the MLT FX User Guide for full details of palette functions, including mixing colours, colour spaces, saving colours and transferring colours.

Aperture (Defocus)



A positive value in the *amount* box defocuses/blurs the image; a negative value sharpens the image.

When sharpening the image, an additional *sharpRad* (radius) box appears that controls the width of sharpness.

Secondary Grading

Introduction

The *colour* process provides various functions which can be used in isolation or together to perform secondary (ie selective) colour corrections so that a specific colour or range of colours is affected without affecting other ranges.

For example, by using *revolver, fettle* or *selective* functions, the colour of the sky in the image could be modified without affecting the colour of the grass or buildings in the image. You can also stack levels of correction via the Cascade function, which makes any subsequent corrections easier and allows you to compare or disable each level. You could use the first Cascade level to correct the sky, the second level to correct the grass and the third level to correct the buildings, etc.

Secondary correction tools (*revolver, fettle* or *selective*) are available by pressing on the menu item; more options for the selected function then appear on the right.

revolver This allows you to select input colours on the current clip and adjust the output, while colour matching easily and accurately in HSL mode without using keys. Up to six selective colour corrections can be applied on a single cascade level. 'Barrels' are used to place input and output colours into and any colour selection can be inverted (reversed) if required.

fettle In order to make accurate/fine adjustments this function provides various types of YUV, RGB and HSL graphs, allowing you to modify custom curves for individual colour channels.

selective This allows colour correction to be applied to the areas defined by the key channel of the layer or by using colour ranges selected directly from the image itself. Dynamic graphic shapes or text can be used to create a mask (protected area). The key area (or the inverted/reversed area) can then be graded while the non-key area is protected from the grade changes.

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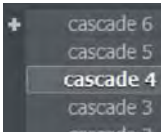
Cascades

Multiple Level Grading within a Video Layer



Levels of colour correction can be created in a stack on each video layer so that the overall effect 'cascades' down through the stack. Starting after the *base* level (use this for primary corrections), you can create subsequent Cascade levels for secondary corrections by pressing '+' then perform the corrections on each level in isolation.

For example, you could use the first level to correct the image's sky, the second level to correct the grass and the third level to correct the buildings, etc.

You can stack and rename levels of correction then select a level and easily view and change the parameters. Each level can be deleted, reset, disabled or moved up/down through the stack to change the overall effect.

You can also use Cascade levels in the MLT FX – *key* process to create complex key areas.

See 'Overview – Using the Process Stack' for more information on adding, naming, re-ordering, deleting and resetting Cascades.

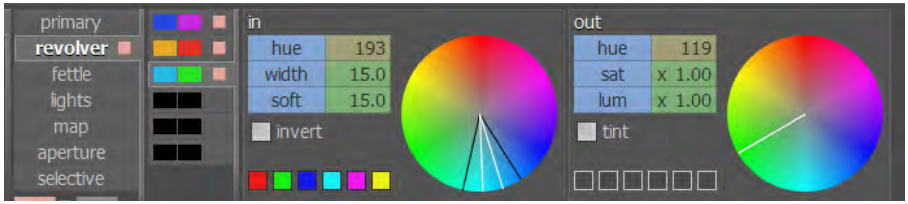
Grading Inside or Outside the Key (In/Out)

On each Cascade level, you can toggle between the inside or outside of the current key area before performing a subsequent correction on the active area. Select the *in* or *out* box then perform a grade. The *in* box is enabled by default when a colour change is made.

For example, with the *in* box on (normal mode), you could perform a desaturation on the base Cascade. If you now create a key, the desaturation affects only inside this key area and no other areas. However, if you create the key, enable the *out* box then perform the desaturation, inside the key area is protected and outside the area is affected.

Revolver

Modifying a Colour Range without Keys



The *revolver* function allows you to select input colours on the current clip and adjust the output, while colour matching easily and accurately in HSL mode without using keys. Up to six selective colour corrections can be applied on a single cascade level.

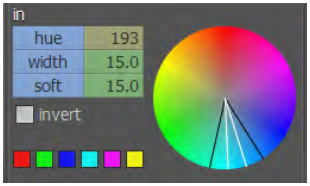
Using Barrels

'Barrels' are used to place input and output colours into and any colour selection can be inverted (reversed) if required. Barrels can be reset by pressing *reset* followed by the barrel, or by moving to a different timeline clip to reset all barrels. The square boxes to the right of each filled barrel can be selected to enable or disable these settings on the current image. The six barrels can be saved into the Settings Bin for future use.

The six barrel corrections can be used on a mask created from a shaped graphic.

Note that barrels display only the hue value of the input and output colours (not saturation and luminance), so barrel colours may appear slightly different to the selected image colours.

Step 1: Select an Input Colour



To place a source/input colour from the current clip into a barrel (so it can be adjusted) use the *in* menu functions and do the following:

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1 Select an empty barrel by pressing on it with the cursor. The current barrel highlights (empty barrels are black).

2 Select the required input colour by using one or a combination of these methods:

- **a** select a colour on the image using the cursor
- **b** select a colour swatch from one of the six pots
- **d** select/move a colour on the Colour Wheel

AND/OR

- **d** adjust the values in the *in – hue, width* and *soft* boxes.

3 The input hue value (but not saturation or luminance) is now displayed across the whole barrel. If required, use the *in* menu to adjust the input colour as follows:

hue	This determines the centre value of hue in the source image.
width	This selects the range of hues about the chosen *in – hue* value (indicated by the white segment on the Colour Wheel). This controls subtle hue changes when sampling areas of colour on the image.
soft	This softens the transition at the edges of the selected hue range (indicated by the black segment on the Colour Wheel). This controls the blending of hue range at the edges.
invert	Tick the *invert* box to reverse the input, so all other colour ranges except the input range will be subsequently affected.

4 **To use an input colour for a different timeline clip:** select a barrel or a colour from the image then hold down on one of the six input colour swatch pots; this overwrites any existing colour in the pot. Navigate to the required clip, select an empty barrel then the swatch pot and apply the changes on its input and/or output colours.

If required, recall all default R, G, B, C, M, Y preset swatches by pressing *reset* then the pot area.

Step 2: Select an Output Colour

To select an output colour from the current clip (which then appears in the right half of the current barrel) use the *out* menu functions and do the following:

1 Select the barrel with the required input colour; this barrel highlights.

2 Select the output colour by using one or a combination of these methods:

- **a** select a colour from the Colour Palette by pressing <F2> or swiping the pen off the tablet. Mix or choose a colour from the palette then press <F2> again or swipe to recall the *revolver* menu
- **b** move the Colour Wheel cursor
  AND/OR
- **c** adjust the values in the *out* – *hue, sat* and *lum* boxes.

As the output colour values are adjusted, the image updates. The output hue value (but not saturation or luminance) is now displayed in the right half of the barrel.

3 If required, use the *out* menu to adjust the output colour as follows:

hue	This sets the new centre value of output hue in the target image.
sat	This sets the new saturation output value in the target image.
lum	This sets the new luminance output value in the target image.
tint	'Rotate' mode (ie the default with *tint* not ticked) allows a hue range to be adjusted on the output values which softens/blends the output, whereas ticking *tint* provides a sharp single output hue.

4 **To use input/output colours for a different timeline clip:** select a barrel then hold down on one of the six output colour swatch pots; this overwrites any existing input/output colours in the pot (note that there are no presets). Both the input and output colours are stored in the pot, but only the output colour is displayed. Navigate to the required clip, select an empty barrel then the swatch pot and apply the changes on its input and/or output colours.

If required, empty all pots by pressing *reset* then the pot area.

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Fettle

Modifying a Colour Range via Graph Curves

The *fettle* function provides various YUV, RGB and HSL graphs from which you can modify individual channel curves (ie red, green, blue, yellow and cyan).

You can control brightness, contrast, hue etc by independently adjusting the interaction of YUV, RGB or HSL input and output in the image via different graphs: each graph consists of a specific LUT.

Selecting a Colour Space & Graph Type

Select *fettle* then either *yuv, rgb* or *hsl* colour space from the list on the right. Select one of the colour space's nine graphs in the *curves* area by pressing on a graph miniature. The graph then displays on the desktop for modification (see later in this section for all graph types).

HSL colour space is useful when performing very subtle colour changes.

Modifying a Graph

Each graph indicates the curve of input colour (the horizontal axis) in relation to the output colour (the vertical axis). As you adjust the desktop graph, the image in the Edit Window and the graph miniature updates to indicate these changes.

You can drag one of the control nodes (large dots on the line/curve) to a different position; add nodes by pressing on the curve; drag node handles to change the curve; or use control boxes to edit the curve.

To move a node anywhere:
Press on a node then drag it to a new position.

To move a node along an axis:
Hold down and pause on a node to restrict its movement to only the x or y axis, then drag and drop the node at the new position.

To add a node:
Additional nodes can be used to profile the colour adjustment or to limit its range. On the curve, press on the required position to insert a new node.

You can also use these graph control boxes as follows:

del — Deletes the selected node from the curve (press *del* then the required node). You can delete all nodes from the curve except the defaults.

'default' — Use this scroll box to select the curve transition through a node (you can also use *tangents*); *default* provides the smoothest rate of change. Alternatively, select one of the following then press *all*:

- *curved* — the rate of change through the curve slows as it enters the node and quickens as it exits the node.
- *stopped* — the change stops as it enters the node.
- *linear->* — the rate of change through the curve remains constant as it exits the node.
- *->linear* — the rate of change through the curve remains constant as it enters the node.
- *->linear->* — the rate of change through the curve remains constant as it enters and exits the node: this creates straight lines through all nodes.
- *User Set* — the rate of change through the curve is set by user modified tangents on the node.

copy/paste — Allows nodes from one graph to be copied and pasted into another graph. Select *copy* and draw a lasso (box) around the nodes to be copied, open another graph then select *paste.*

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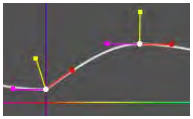
tangents



Tick this to display tangents that emanate from each node point. Drag the handle on the end of a tangent to modify the curve (you can also use the '*default*' scroll box described previously to change the curve through a node).

A yellow tangent affects the curve entering and exiting the node; a magenta tangent affects the curve entering the node; a red tangent affects the curve exiting the node.

range — Tick this to show the range of the colour adjustment.

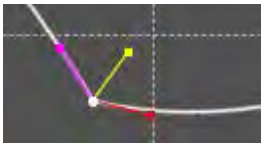
zoom — Makes finer adjustments easier. Draw a lasso (box) over the area you want to zoom; the graph now zooms in and a ticked *zoom* box appears. Deselect this box to return to the original size.

x 0.000.../y.000... — These two numeric boxes appear when you select a node. Instead of dragging the node, you can change the required value in this box to move it accurately or by a small amount.

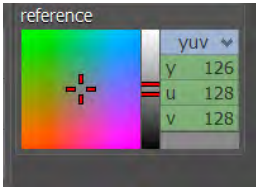
restrict — Tick this to snap the movement of any node to the curve, eg if you move the cursor left or right, the node moves left or right but always follows the line of the curve.

<> 000 — This numeric box appears on the first three HSL graphs and allows you to scroll the curve with its nodes left or right across the graph for easier editing.

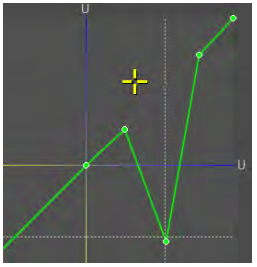
Viewing Input & Output Colour Points (Reference Menu)



If you press on the colour you want to change on the image, it appears referenced on the graph as a vertical dashed line. Now in the *reference* area, you can select the required output/target colour which appears on the graph via the horizontal dashed line.



Set the *reference* output colour by choosing a colour space from the blue scroll box, then either press on a colour in the palette, or enter numeric values in the green boxes. Use the slider to affect the colour's luminance. The reference colour appears in the swatch in the bottom-right of this area.



On the corresponding graph add a node either side of the vertical line and one in the middle. Drag the middle point to the intersection point (ie the target colour). The selected colour on the image should change; you may need to modify the nodes to adjust all the range required. Note that positioning of nodes depends on the graph type and the required effect.

Using Fettle Graphs with Keyframes

Fettle adjustments can be viewed as points on the keyframe graph, which shows the curve of output colour against time. Open this graph by right-clicking or dragging the yellow line below the process stack upwards. Tick the *auto* box to enable keyframes to be inserted automatically whenever a Fettle graph parameter is changed.

On the keyframe graph, navigate to a specific Fettle parameter and select the node or draw a lasso around multiple nodes. The selection now appears in the current Fettle graph where you can adjust the parameter.

You can move a group of Fettle keyframes by lassoing the required nodes then dragging them along the keyframe graph.

Menu or panel functions such as *contrast, bright, lift, gamma or gain* can be used with graphs for accurate primary corrections.

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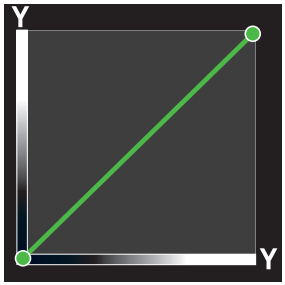
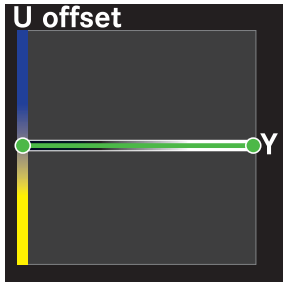
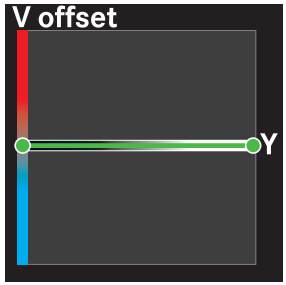
YUV Graph Types



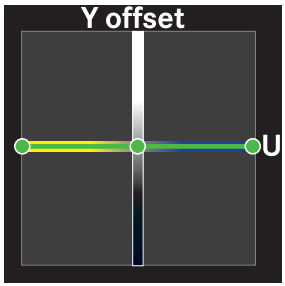
1 luminance:
Y in vs Y out



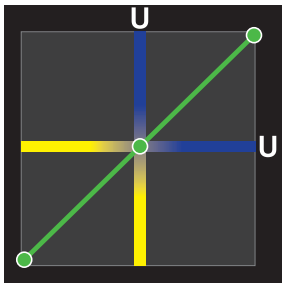
2 cast blue/yellow:
Y in vs U out



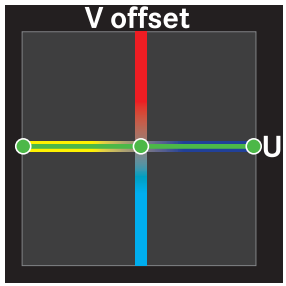
3 cast red/cyan:
Y in vs V out



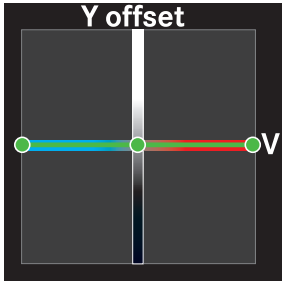
4 gain blue/yellow:
U in vs Y out



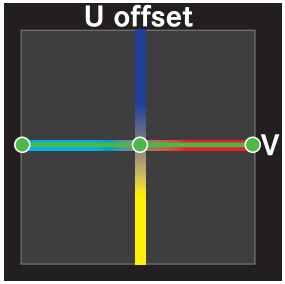
5 balance blue/yellow (sat/hue):
U in vs U out



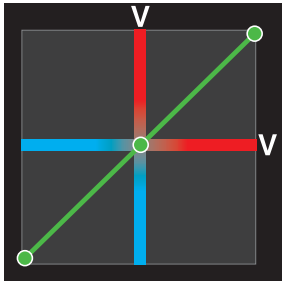
6 hue blue/yellow to red/cyan:
U in vs V out



7 gain red/cyan:
V in vs Y out

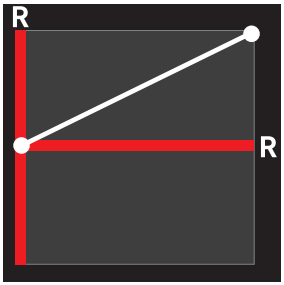


8 hue red/cyan to blue/yellow:
V in vs U out

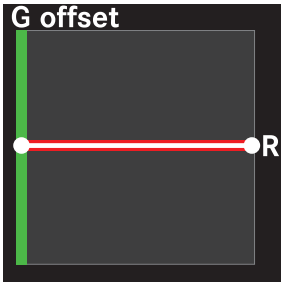


9 balance red/cyan (sat/hue):
V in vs V out

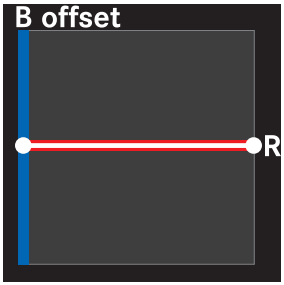
RGB Graph Types



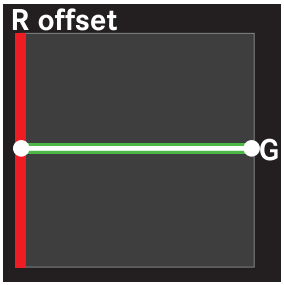
1 gain red:
R in vs R out



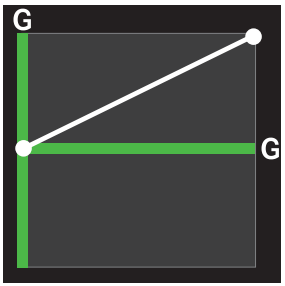
2 balance green/red:
R in vs G out



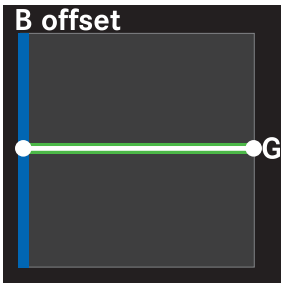
3 balance blue/red:
R in vs B out



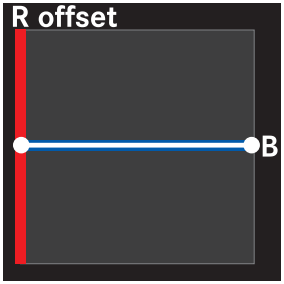
4 balance red/green:
G in vs R out



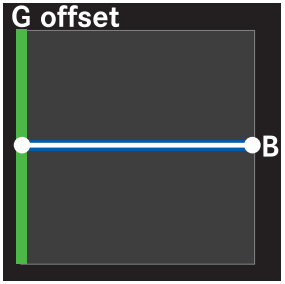
5 gain green:
G in vs G out



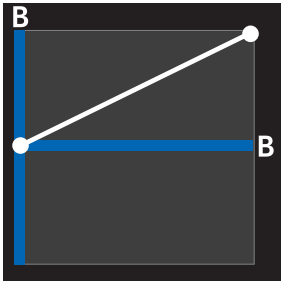
6 balance blue/green:
G in vs B out



7 balance red/blue:
B in vs R out



8 balance green/blue:
B in vs G out



9 gain blue:
B in vs B out

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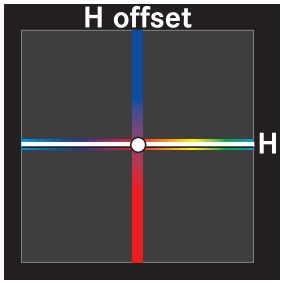
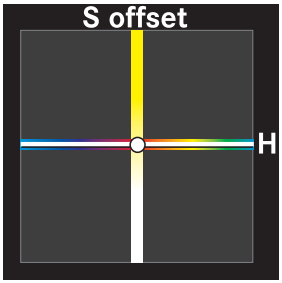
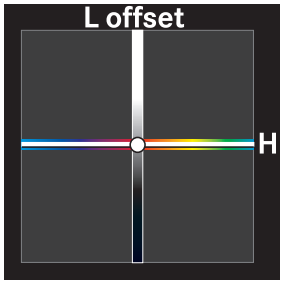
HSL Graph Types



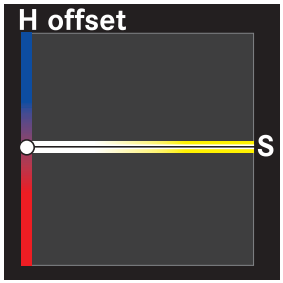
1 *hue in vs hue out*



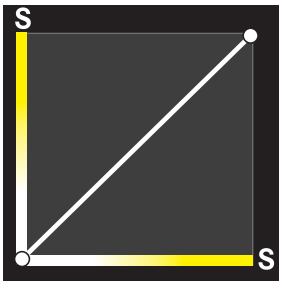
2 *hue in vs saturation out*



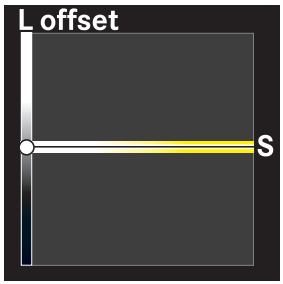
3 *hue in vs luminance out*



4 *saturation in vs hue out*

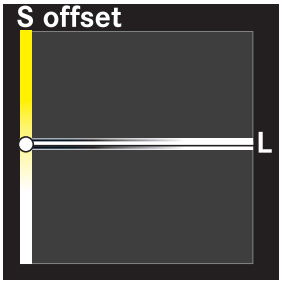


5 *saturation in vs saturation out*

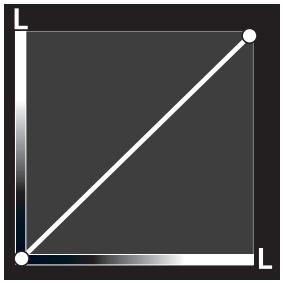


6 *saturation in vs luminance out*

7 *luminance in vs hue out*



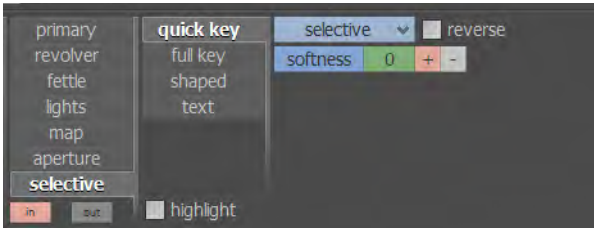
8 *luminance in vs saturation out*



9 *luminance in vs luminance out*

Selective

Modifying a Colour Range via Keys



The *selective* function allows you to apply corrections to sampled colour range or vector object keys without affecting other ranges or areas on the image.

Viewing a Key

highlight key view: hicon

highlight key view: desaturated

In any of the key menus you can tick the *highlight* box to display the resultant key as either high contrast (hicon) or with the key highlighted and any unselected key areas shown desaturated (monochrome). Hold down the cursor over the *highlight* box (which turns orange) to set the display type, then at any time toggle between this and the original image display by pressing the box.

Reversing/Inverting a Key

key reversed (eg desaturate other ranges except sky)

In any of the key menus you can tick *reverse* (or *invert* in the *text* menu) to reverse the key created by the sampled colour or vector object. This 'masks' the sampled colour range or vector object from subsequent changes, eg desaturation, while other colours/areas outside the key are affected.

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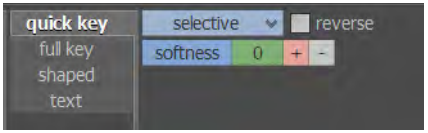
Quick Key – Selective



Use this to quickly change a colour range sampled from the image:

1 Press *quick key* then *selective* from the scroll box.

2 Press the '+' box then press with the cursor or draw a lasso (box) on the image colour range you want to change (eg over an area of blue sky). For the initial selection try and include midtone ranges and not extreme highlights/ shadows of the range. The sampled colour range automatically increases to add a small range of different luminance levels above and below the sampled colour and hues either side.

key colour sample range (eg blue sky)

graded key range (eg desaturate sky)

3 If required, use the '+' box to add more of the colour range to the initial sample; you may want to include more highlights or shadows. If you select too much, press the '-' box and draw a lasso over the unwanted range.

4 Change the colour, which should affect only the sampled colour area, eg change the sky to grey (desaturate it) by entering '0' in the *primary – sat* box. Return to the key functions and if required, tick *reverse* to reverse the key created by the sampled colour (eg everything except the sky now turns grey).

5 There may be some spill around the edges of the sampled colour and inconsistencies in the density of the key produced. Press the '-' box then select ranges to be removed from the sample.

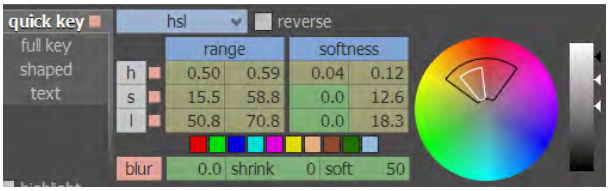
6 Change the *softness* value to soften the key edges if required.

7 If necessary, use the '+' and '–' boxes to accurately adjust the key range.

The keys from each sample combine to create the final key through which the colour correction is applied.

Sampling a very small area may produce poor results if the sampled colour is grainy or poorly lit. Alternatively, sampling large areas may select colours outside the required colour range. Try using different lasso sizes and sample different areas to include the whole luminance range of key colour.

Quick Key – HSL



Use this to create a key from the specified range of hues, the specified range of saturation and the specified range of luminance:

1 Press *quick key* then *hsl* from the scroll box (see 'Quick Key – Selective' at the start of this section for general details of sampling and modifying colour ranges).

2 Press with the cursor or draw a lasso (box) on the image colour range you want to change, or select one of the ten presets by pressing a swatch pot: these enable you to select standard image colours which you can then adjust. If you want to use this new colour on another clip, hold down on a swatch pot (placing it into this pot and overwriting any existing colour). From left to right presets are: red, green, blue, cyan, magenta, yellow, plus two skin/earth and grass/sky tones.

3 If required, enter numeric values in the *h, s* and *l* left and right *range* boxes to specify minimum/maximum colour ranges. To soften each component, enter minimum/maximum values in the left/right *softness* boxes. You can also adjust ranges by dragging the Colour Wheel and Luminance Bar cursors as

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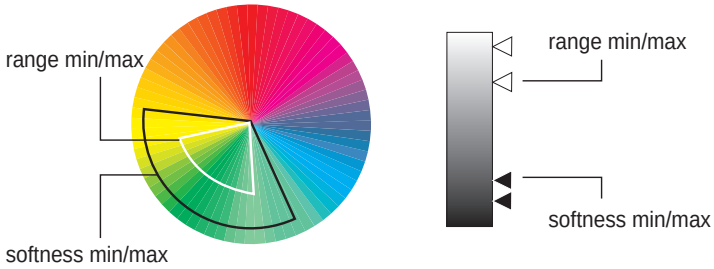
shown in the following diagram:

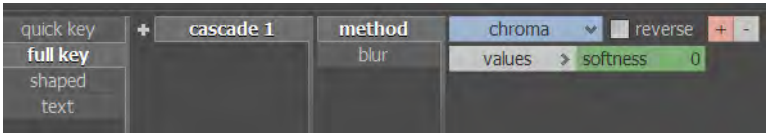


4 Perform the colour correction on the HSL range, then if necessary adjust the range or softness of the resultant key.

5 To blur the key, press the *blur* box and enter a value in the first numeric box to change the depth of blur. Change the *shrink* value to grow or shrink the edges of the overall key (positive values grow the edges; negative values shrink the edges). Soften the edges of the key by changing the *soft* value.

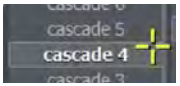
Select one of the *h, s* or *l* boxes then drag the cursor from the *range* or *softness* box to adjust both its minimum and maximum values simultaneously.

Full Key



Use the *full key* function to create a complex key on the current video track. Do this by adding cascade levels within the key function, then on each key-cascade level, create a simple key using one of the methods from the scroll box. These levels then combine to produce a single composite key. You can have multiple key-cascade levels on a single colour-cascade level (the latter is selected by pressing '+' on the right of the *colour* box).

Press the '+' box to the left of *cascade 1* to create a new key-cascade level, then when you've finished the key, press '+' to commit this key and start a new key on *cascade 2.*



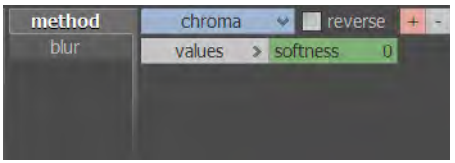
If you want to edit a key level, select it from the Cascade list then change the required parameters.

To start creating the key, press *method*, then select the key type (*chroma, chroma YUV, linear* or *input*) from the scroll box on the right.

Full Key – Blur

To blur any full key type, press the *blur* box and enter a value in the *amount* numeric box to change the depth of blur. Change the *shrink* value to grow or shrink the edges of the overall key (positive values grow the edges; negative values shrink the edges). Soften the edges of the key by changing the *soft* value.

Full Key – Chroma



With *method – chroma* selected, you can sample key colours based on the current image's YUV/RGB values:

Do this by drawing a lasso and pressing the '+' and '-' boxes (follow steps **2** – **7** in the 'Quick Key – Selective' function at the start of this section).

You can also adjust components as follows:

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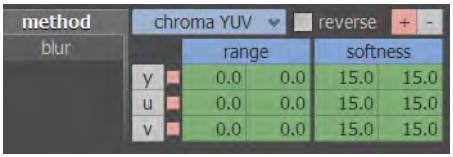
values Displays a pop-up allowing the *low* and *high* values for each YUV component to be adjusted independently. Soften the resultant key by adjusting the boxes in the *soft* column.

Full Key – Chroma YUV



With *method – chroma YUV* selected, you can create a key from the specified range of Y luma, the specified range of U chrominance and the specified range of V chrominance:

Do this by drawing a lasso and pressing the '+' and '-' boxes (follow steps **2** – **7** in the 'Quick Key – Selective' function at the start of this section).

You can also adjust components by entering numeric values in the *y, u* and *v* left and right *range* boxes to specify minimum/maximum colour ranges. To soften each component, enter minimum/maximum values in the left/right *softness* boxes.

Select one of the *y, u* or *v* boxes then drag the cursor from the *range* or *softness* box to adjust both its minimum and maximum values simultaneously.

Full Key – Linear

With *method – linear* selected, you can create a key by selecting a key threshold range on the image:

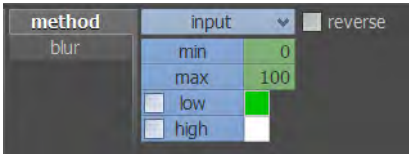
1 Drag a lasso over the key colour you require on the image. You can now adjust the following to eliminate spill and inconsistencies:

min controls the low threshold of the key; image information below this threshold is ignored.

max controls the high threshold of the key; image information between the *min* and *max* level is the key area.

It may be useful to start with a *min* value of 20 and a *max* value of 80, then make small increments until you achieve the required result. The input key inverts if the *max* value is less than the *min* value.

Full Key – Input



With *method – input* selected, you can specify the threshold range of the key so that the best area of a sloped edge input key can be selected.

Select the required low and high key colours on the image as follows:

low — tick this box then select a 'low 'colour reference from the image; this appears in the corresponding swatch pot.

high — tick this box then select a 'high' colour reference from the image; this appears in the corresponding swatch pot.

Adjust each colour by changing the *min* and *max* numeric values:

min — controls the low threshold of the key; image information below this threshold is ignored.

max — controls the high threshold of the key; image information between the *min* and *max* level is the key area.

The input key inverts if the *max* value is less than the *min* value.

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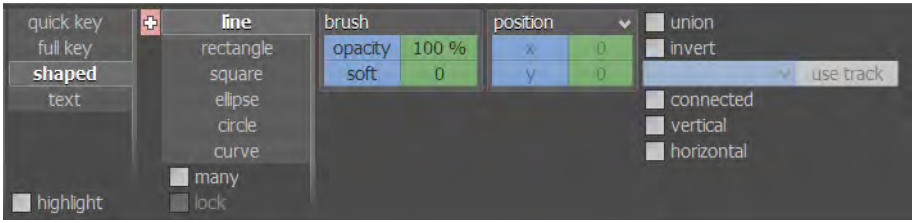
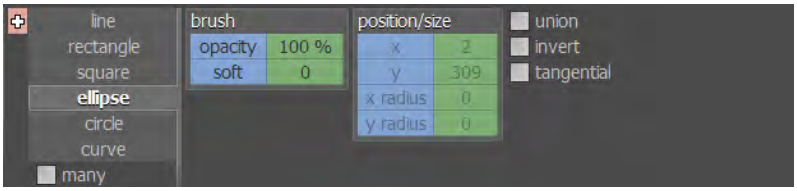
Shaped



Use the *shaped* function to apply colour corrections to vector shaped areas of the image; each shape can be combined with others on a Cascade level and keyframed to produce complex dynamic shapes. Most options are the same as in the MLT FX *graphics* process or *key* process's *garbage* function:

1 Select the key shape you want to draw from the list, eg *ellipse*. The *ellipse* sub-menu now appears on the right (see following screen shot). At any time you can press '+' to toggle between the existing shape stack and the new shape stack; each shape displays slightly different modification options.



2 If required before drawing a shape, tick any available options for the shape:

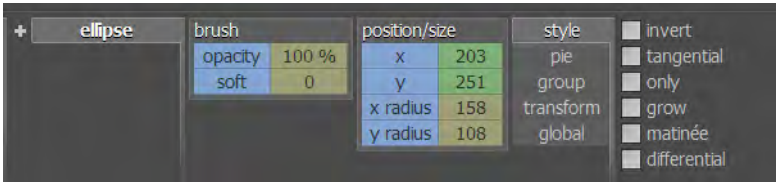
many — Allows multiple shapes of the same type to be drawn anywhere on the image area. It also allows parallel lines to be drawn (with *line* plus *horizontal* or *vertical* ticked).

lock — This can only be selected in conjunction with *many*; it allows shapes to be drawn inside/outside each other from one reference point, plus concentric shapes to be created (ie with the reference point in the centre of the shape). The first cursor press becomes the 'locked' start point for subsequent shapes. To finish drawing the 'locked' shapes, right-click with the cursor.

union — Combines/welds overlapping shapes. If shapes overlap and union is not selected, the overlap area is used as the key area.

invert	Inverts the key area.
centred	The cursor starting point now represents the centre of the rectangle/square instead of the corner.
gradient	Provides 4 pots into which you can deposit up to 4 colours from the Colour Palette (press <F2> to open it). The subsequent rectangle/square then fills with the graduated colour from each corner. To create a cleaner/simpler graduation, use only 2 or 3 colours in the 4 pots.
tangential	The first cursor press fixes the start of the circle/ellipse and the second cursor press defines both the size and the angle of ellipse (with *tangential* off, an ellipse will be aligned to a horizontal or vertical axis).
connected	Joins subsequent lines together.
vertical	Snaps the subsequent line to the vertical axis.
horizontal	Snaps the subsequent line to the horizontal axis.
straight	Draws a 'curve' as a straight line.
closed	The first and last line/curve node snap together to form a closed shape.
use track	A tracking path line/curve can be used with multiple points on it that has been created within the MLT FX *Tracker* function.

3 Draw on the image area by pressing the cursor to fix the first point of the key shape then move the cursor and press again to finish drawing. When a key shape has been drawn, in this example an ellipse, it is automatically assigned the name *ellipse* displayed in the first column, and more style options appear on the right (see following screen shot):



4 You can overwrite this name by double-clicking on the name and entering a new one in the soft keyboard pop-up.

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5 If you want to draw another shape to modify the key, press the '+' box, select and draw a new shape, then the individual shape stack updates. Each subsequent shape is placed above the previous one and automatically increments (eg *ellipse 2, ellipse 3* etc) Rename the shapes if required (see step **4**).

6 Draw and modify each shape by pressing the '+' box and changing the individual parameters, eg *opacity* and *soft* (to blur the key edges).

7 Move or resize the shape(s) by dragging and dropping or by using the numeric boxes; all style/transform options are described in the next sections.

Shaped – Styling & Softening the Shape

Press the *style* box and use the following options to modify the key shape:

only — Prevents other shapes being selected by mistake if they overlap each other.

grow — Tick this and enter a value in the numeric box to shrink/grow the edges of the overall key (positive values grow the edges; negative values shrink the edges).

tangents — Tick this to display tangents on the connected line/curve that emanate from each node point (when you hover the cursor over the shape). Drag the handle on the end of a tangent to modify the curve. A brown tangent affects the curve entering and exiting the node; a magenta tangent affects the curve entering the node; a red tangent affects the curve exiting the node.

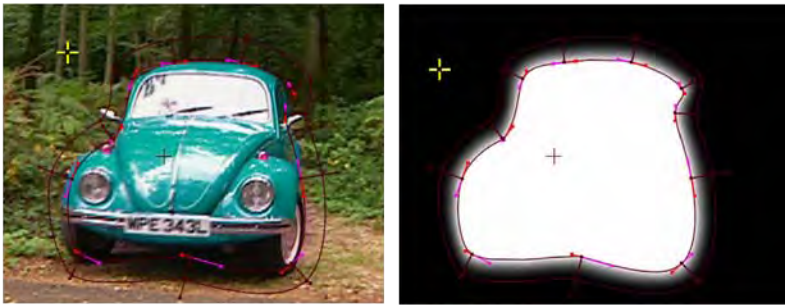
differential — Only appears with Stereo3D media; see 'Disparity & Differential' later in this section.

matinée — The *style – matinée* box allows the edge of the key shape to be feathered (softened) and the level of feather adjusted on specific areas.

Draw a key shape then tick *matinée*. A matinée outline now appears over the existing shape outline. Depending on the shape, either enter a positive/negative value in the single numeric box (to grow/shrink the shape), or vertical and horizontal grow/shrink

values in the two boxes. Keep the cursor positioned over the image area to provide a wireframe display of the two outlines.

BEFORE: curve drawn around item before matinée applied



AFTER: after colour change and matinée value of +20

When you have performed a colour correction, increase or decrease specific areas of the matinée effect by selecting a single node or lassoing multiple nodes on the matinée outline then dragging to a new position. This changes the level of feather between the shape and the matinée outlines. You can also modify the matinée curve using the *transform – curve properties* floating menu functions (see later in this section); the *m* box in this menu selects all matinée nodes only.

If you modify the original shape outline, the matinée curve moves with it. If you modify the matinée curve, the original shape outline does not move.

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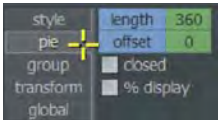
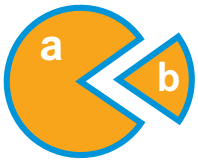
Shaped – Creating Pies & Slices



Circles and ellipses can be converted to a pie or a pie slice by selecting the *pie* menu that appears after a shape is drawn.

The *length* value determines how much of the pie/slice is displayed. By default it displays in degrees, but you can tick *% display* to view the length as a percentage.



The *offset* value determines where you cut the pie. The *closed* box transforms the cut as shown in diagram **a** or diagram **b** depending on the *length* value previously set.

Shaped – Grouping & Alignment

Press the *group* box to group multiple shapes together by selecting them with a lasso (the shape names highlight to indicate those selected), then pressing *make*. You can now reposition or resize the group as a single object and subsequent colour changes affect every shape in the group.

Each group is named eg *group, group 2, group 3* etc, which can be changed by double-clicking on the name then entering a new one in the soft keyboard.

Press *split* to break the current group back into individual shapes. Remove/add any shape from the current group by selecting *edit* then pressing on a shape.

If you drag a lasso around multiple shapes with the *group* menu selected, the align menu appears.

align left edges

align vertical centre

align right edges

align top edges

align horizontal centre

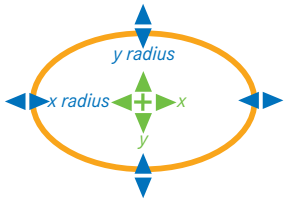
align bottom edges

Pressing one of these options aligns the selected shapes accordingly.

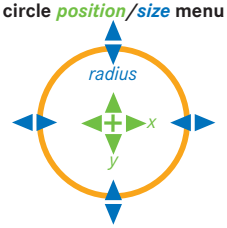
Shaped – Positioning & Transforming

As well as manually resizing or positioning a shape, you can use the *position/size* menu to enter numeric values. The options available depend on the shape. For rectangles and squares, the *corner* menu can also be toggled on by pressing the *position* menu's 'v' symbol and if a single line is drawn an *end points* menu becomes available by pressing the 'v' symbol.

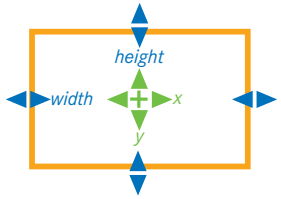
ellipse *position*/*size* menu



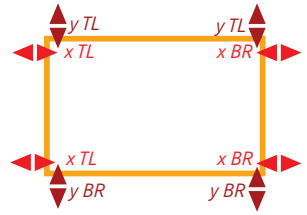
circle *position*/*size* menu



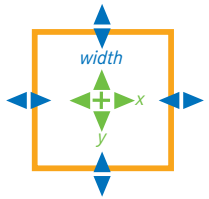
rectangle *position*/*size* menu



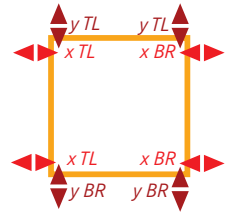
rectangle *corners* menu



square *position*/*size* menu

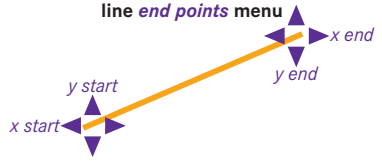


square *corners* menu



line/curve *position* menu

line *end points* menu



See above diagram for all position, size, corner and end point menu options.

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Press *transform* to perform a transformation on a shape:

x/y axis	Drag the shape's '+' cursor or change the values in the *x axis* and/or *y axis* boxes to move the shape's axis independently of the shape, eg to rotate around its corner instead of its centre.
angle	Rotates the shape around the x and y axis points; these points can be inside or outside of the shape.
scale	Scales the shape in relation to the x and y axis points.
mirror	Mirrors (reflects) the shape horizontally in relation to the x axis point.
tumble	Mirrors (reflects) the shape vertically in relation to the y axis point.
to curve	*(See following section)*.

Shaped – Disparity & Differential (Stereo3D Only)

With stereo media, a *disparity* option appears in both the *selective – shaped* and *selective – text* menus. This controls negative or positive parallax of the vector object, eg entering -5 pixels applies negative parallax appearing to bring the vector object forward of the screen.

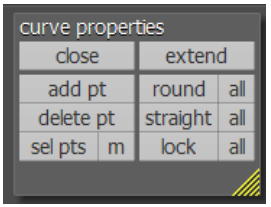
On shapes, you can use the *style* menu's *differential* tick box with the *disparity* function as follows:

differential **ON**	disparity adjusts each eye equally in opposite directions relative to the position of the original shape.
differential **OFF**	disparity adjusts the right eye only. This enables you to draw a shape accurately around the required area on the left eye, which then remains in position while the right eye disparity is adjusted.

Shaped – Converting to Curves & Curve Properties

If you select *transform – to curve,* a basic shape such as a rectangle or circle is converted into a curve, indicated by the prefix 'cv' in the name field (eg *cv.rectangle*). For example, a circle or ellipse converted into a curve displays four nodes instead of one.

You can then modify the basic shape by moving the extra nodes/tangents that appear and add more nodes, resulting in a more complex shape. Tick *tangents* to see and modify the nodes.



The *transform – curve properties* floating menu appears when a curve or connected line is drawn or a shape has been converted to curves.

Move this menu if required by pressing on an empty area of the menu and dragging it to the required position. Left-click on the yellow triangle on the bottom-right to return it to the default position; right-click to toggle between current/default positions.

The *curve properties* menu provides the following functions:

close — Closes the current open curve.

add pt/ — Press *add pt* then press on the curve to add a new point (node) at this position.

delete pt — Press *delete pt* then press on the curve to delete this point. The curve automatically rejoins and adopts the properties of the nodes either side of the deleted one.

sel pts/ edit sel — Press *sel pts* (select points) then draw a lasso around nodes to select them. The selected nodes can then be moved together, locked, set to *straight* or set to *round*. The *edit sel* (edit selection) box then appears to allow individual nodes in the current selection to be deselected or additional ones to be added.

(m) — This only appears (next to *sel pts*) if *matinée* has been applied; it selects all the nodes on the matinée curve so that this can be moved/edited independently of the original outline.

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extend Allows new nodes to be added to the 'finish' point of an existing curve or shape. Click where you want to place the new nodes.

round/all If the *round* box is enabled after a connected line has been drawn (ie with straight lines between each node) you can then press on any node and the line in and out of this node becomes curved. If *all* is selected, all the points on the current curve are set to round.

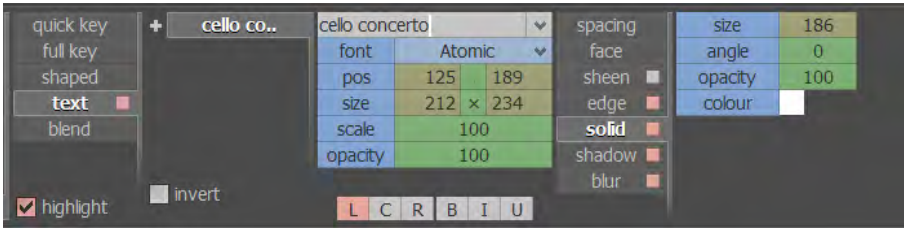
straight/all If the *straight* box is enabled after a curve has been drawn (ie with curved lines between each node) you can then press on any node and the line in and out of this node becomes straight. If *all* is selected, all the points on the current curve are set to straight.

lock/all If the *lock* box is enabled after a curve or shape has been drawn, you can then press on any node and it will become fixed in its current position. If *all* is selected, all nodes on the current curve are fixed in their current positions.

Note that a basic shape (eg circle) cannot be converted back into its original form after it has been converted to curves.

Tick *Shapes Preview* in the <F1> Configuration Window's *UI* menu to see a wireframe preview of the shape as you drag it over the image area.

Text



Use the *text* function to apply colour corrections to vector text shaped areas of the image. Most options are the same as in the MLT FX *text* process or *key* process's *text* function.

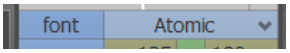
Installing Fonts

The fonts used by the Quantel kernel are True Type and are installed in the C:\Windows\Fonts folder. These fonts are then displayed in the Quantel Fonts Bin on the Application Bar.

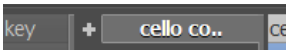
Fonts can be loaded into the *text* function's scroll box by opening the Fonts Bin from the Application Bar, then selecting and dragging them from the bin and dropping them on the scroll box. Up to 20 fonts can be held in this list.

A browse display of each font can be selected in the Fonts Bin. The yellow symbol in the top-left corner of the open bin toggles between titles and browse display.

Users are responsible for ensuring that they have the appropriate rights to install and use specific typefaces and fonts



1 Select the font that you want to use from the *font* scroll box.



2 Press the'+' box to add text.

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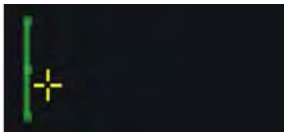


3 On the image area, press where you want to start the text key. A box appears; this is the 'container' for the text and it resizes as text is entered.

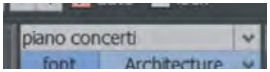
4 Now enter the text. You can create a single character, word, line or multiple lines. Notice that the text name (in the stack to the right of the '+' box) and the text entry field next to this update as you type; you can also enter text using this entry field.

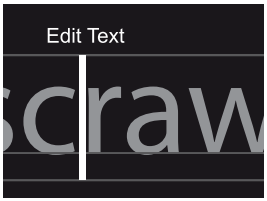
5 Press <Return> to create a new line within the same text box. Press <Ctrl> + <Return> to create a new independent text box under the original (the stack on the left of the menu area updates accordingly).

6 You can now change the font, re-size or re-position the text and add colour styles to it. These options are detailed in the following pages.

Text – Modifying & Styling

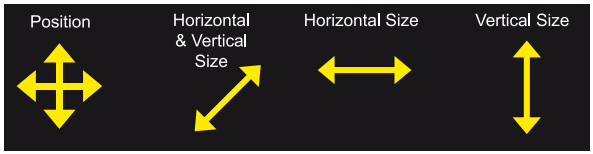
Select a text object by pressing the required name in the stack next to the '+' box. Alternatively, you can press on the text on the image area to select it; the stack name box highlights accordingly.





Change characters and words in the current text box by clicking in the text entry field (shown on the left) then drag over the characters you want to change.

Alternatively, press inbetween text characters on the image (the 'I' cursor indicates the point of change).



Reposition or resize text manually by hovering one of the yellow cursors over the text box then dragging. Alternatively, use the *pos, size and scale* menu options.

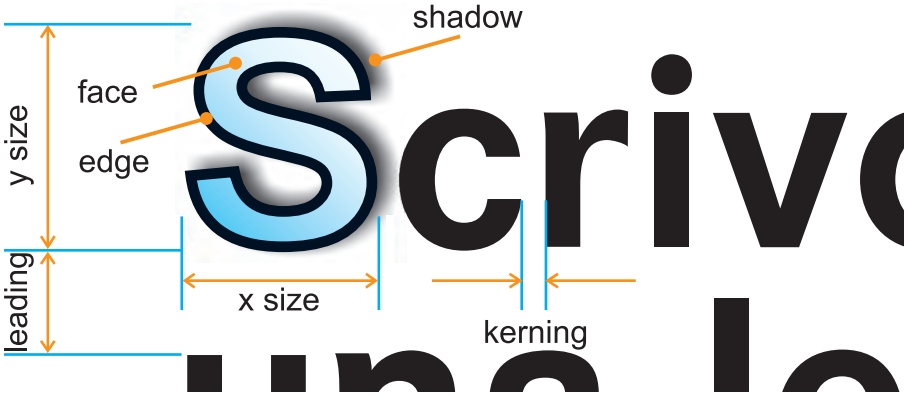
You can also use the following menu options to modify and style text:

opacity Affects the transparency of the text key (0 is transparent).

disparity Only appears with Stereo3D media. This controls negative or positive parallax of the text object, eg entering -5 pixels applies negative parallax appearing to bring the text forward of the screen.

L, C, R Controls the horizontal alignment of text (left, centre and right). Note that you can also use the *grid* function to align text.

B, I, U Makes the current text either **bold**, *italic* and/or <u>underlined.</u>



The *spacing – kerning* menu affects horizontal spacing between characters:

the value in the green *global* box affects the kerning between all characters in the current text box.

the value in the green *current* box affects the kerning of the currently selected character (ie at the cursor position). Ticking the box allows you to manually drag the space using the 'I' cursor in the text box.

The *spacing – leading* menu affects vertical line spacing:

the value in the green *global* box affects all the line spacing in the current text box.

the value in the green *current* box affects the line spacing of the currently selected line (ie at the cursor position). Ticking the box allows you to manually drag the space using the 'I' cursor in the text box.

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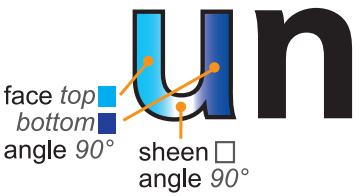
The *face* menu allows the fill colour of the text to be set:

Set the fill as a single colour, a 2 colour gradient or a 4 colour gradient; select *one, two* or *four* from the *colours* scroll box. You can transfer colours from the Colour Palette to the colour pots that appear; toggle the palette on/off by pressing <F2> on the keyboard.

Note that with *two* selected, you can also choose the ratio of the two colours by changing the *top* and *bottom* values then define an *angle* to rotate the colours (but not the text).

The *sheen* menu allows a coloured highlight to be applied to the face of the text:



You can transfer a highlight colour (the default is white) from the colour palette to the *colour* pot then specify the *size* and *opacity* of the highlight within the text. The *distance* value controls the highlight's distance from the text edge and the *angle* value controls the rotation of the highlight (but not the text).

The *edge* menu allows a coloured outline to be applied to text characters:

The *size* box controls the thickness of the outline and the *colour* pot defines the outline colour. The *opacity* value controls how transparent the outline is.

The *solid* menu adds an extruded 3D effect behind the text face:

The *size* box defines the depth of the extrusion and the *angle* box defines its angle from the face. The *colour* pot defines the colour of the extrusion.

The *shadow* menu creates a shadow behind the text:

The *distance* box defines the distance it is positioned from the text; *opacity* defines the shadow's transparency; *angle* defines the shadow's offset position from the text and the *softness* box defines the blur/feathering of the shadow. Enter a *size* value to make the shadow larger or smaller and use the *colour* pot to change the shadow colour.

The *blur* menu allows you to apply vertical blur on the whole text key.

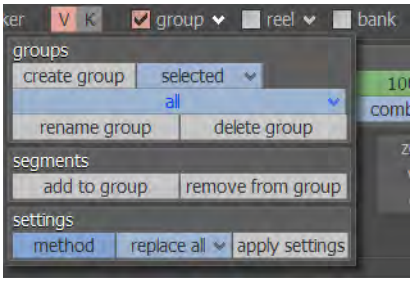
Some of the previous style options may be difficult to view on the key area; use the hicon/highlight view to see the text key clearly.

Applying Group Grades

Grading a Specific Group of Clips

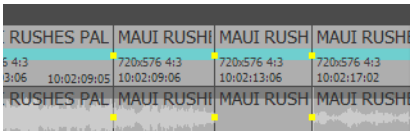
You can create a group of clip segments based on specified criteria, eg originator, source timecode, manual selection etc then grade this group by setting target cascade levels and methods. Multiple groups can be created, saved and modified within the current session.

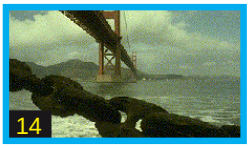
Group Functions & Display



Tick the *group* box on the top-right of the menu area and press the 'v' on the right to view the menu options.

For easier display with a long timeline, tick the *reel – storyboard* boxes.





Clip segments (rendered or unrendered) belonging to the currently selected group are indicated on the timeline with a cyan highlight below the clip name and on the Storyboard with a cyan outline around the tile.

By default, all clips are selected (as indicated in the scroll box displaying *all* near the top of the *group* menu).

Toggle the group function at any time via the *group* tick box.

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Create a New Clip Group

To create a group, do the following:

1 From the scroll box on the top-right, set the group type by selecting one of the following:

selected	allows you to manually select segments by pressing on them.
originator	includes all clip segments with the same originator as the selected segment; this appears in the box below and you can enter a character limit value in the *limit* box.
source tc	includes all clip segments that share the source timecode of the selected segment.
rush	includes all clip segments from the same source rush.
highlight	this option only appears if the *Highlight changes* box has been ticked in the <F1> Configuration Window: it includes all the clips of the current 'highlight' colour, eg red.

1 Press *create group.* Depending on the scroll box selection, the group will be automatically made from corresponding clips, or with '*selected*', each clip can now be selected manually from the timeline.

2 Select *rename group* to rename the group. Enter a name via the soft-keyboard.

3 You can add or remove clips manually from the group as follows:

Select the clip on the timeline then press *add to group* or *remove from group* to add/remove the selected clip segment.

Hold down *add to group* or *remove from group* to enable multiple selection, indicated by the add/move box turning orange: you can now add/remove multiple clip segments by pressing on them. Press the add/move box to cancel multiple selection.

Alternatively, you can use the keyboard to enable multiple selection. Hold down <Shift> then select segments next to each other, or <Ctrl> then select segments anywhere on the timeline. Then press *add to group* or *remove from group* to add/remove all these segments to the group.

Modify a Group

To modify an existing group, do the following:

1. Scroll to the required group using the long blue box. This list displays *all* (the default) then *Group 1, Group 2* etc, unless renamed.

2. Do one of the following:

to modify the group's clips...	use *add to group* or *remove from group* as described previously.
to rename the group...	press *rename group* then enter a name using the soft-keyboard that appears.
to delete the group...	press *delete group*. The selected group is now deleted.

Apply a Group Grade

The following transfer/target options only appear in the scroll box to the right of *method* if a group segment has colour process parameters. Then use this scroll box to specify the application method used for the colour changes on a clip group:

1. Scroll to the required group using the long blue box (or create a group first as described previously).

2. On the timeline, select a group segment and perform the grade.

3. Select which target cascades will be affected by selecting an option from the scroll box to the right of *method*: 'base' options affect the base cascade; 'top' options affect the top cascade; 'all' options affect all cascades. Choose how the grade is applied using various 'replace', 'add', 'insert' or 'trim' options.

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Possible combinations are:

Replace all; top replace; base replace; replace by name; replace all minus base; replace pre-process
applies the grade from the current clip (ie all cascades, HSL, shapes etc) to the other segments in the group in the following ways: to all cascades (with/without base); the top or base cascade only; the cascade which matches the source name; or applies only the pre-process LUT.

Top add; base add
applies the grade from the current cascade only and adds it as a top cascade or under the base cascade on all the other segments in the group.

Insert
inserts the graded current cascade at the same cascade level to all clips in the group (this must be at least above the base level).

Top trim; base trim; trim by name
applies only the change in colour process values to all the segments in the group. 'Top' or 'base' trims the top or base cascade of the destination segment; 'by name' trims the cascade on the destination segment which has the same name as the source cascade.

Note that trim options are available only when the source segment has colour process parameters for primary, defocus, lights or ranges functions. If the destination segment has keyframes, only the change in values in the source segment at the current position is applied to these destination keyframes: source keyframes are not copied.

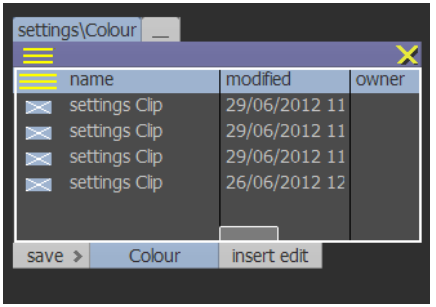
4 Press *apply settings* to apply the selected group grade. Each applicable timeline segment now has an orange highlight along the top indicating that a process is present and rendering is required. Each applicable Storyboard tile has a graduated blue outline (visible only if the group function is toggled off via the *group* tick box).

Note that if the current timeline segment is in the current group, the Storyboard 'orange/cyan' tile outline becomes graduated yellow.

Saving & Reusing Settings

There are several different methods of saving and transferring MLT FX processes (eg colour parameters) between projects. These include the Settings Bin, Storyboard and Stillstore:

Settings Bin



Process settings including colour or colour ranges (fettle graphs), can be saved and archived independently of the timeline edit via the Settings Bin, then used on other projects as required.

Open this bin by pressing the *settings* tab on the Application Bar. If *mlt fx – colour* is open in the GUI, '*Colour*' appears automatically in the bin's scroll box.

You can also choose other settings from this box, including *Colour Ranges,* if you want to save fettle graphs. Press *save* and enter a name to save the current colour settings.

You can then apply a setting to a different project by scrolling to the required process in the bin, eg *Colour*, then dragging the required title from the bin and dropping it on the current clip in the Edit Window.

When transferring *Colour* settings, you can press *insert edit* before dropping the setting onto the image area. This applies only the last keyframe values in the settings clip (eg those for *lift, gamma, gain*) to the current clip at the cursor position. This is useful if you need to transfer the same colour values from the end of one clip to the start of the next. If *insert edit* is not pressed, all the keyframe values (and not just the last) are transferred to the clip regardless of cursor position.

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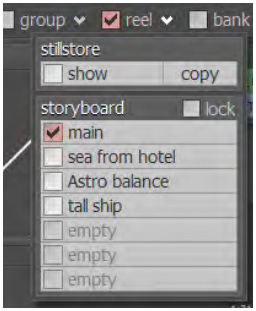
Storyboard

In the Edit application, you can use the Storyboard reel to assemble and move clips for the current timeline edit, and to navigate through the edit. In MLT FX the functionality is slightly different; it allows you to preview and transfer single or multiple processes from clips on the Storyboard to the timeline edit and to easily save different Storyboards during a project which can then be used on other projects.

Stereo3D Storyboard Clips

If the Storyboard contains Stereo3D clips, the left eye only is displayed, although both left and right eye processes are stored and can subsequently be applied.

Displaying a Storyboard



To display the Storyboard, select the *reel* tick box on the top-right of the menu area. The first frame of each clip in the current timeline edit (ie the main Storyboard) now appears as tiles along the reel display; if the timeline is empty, no clips appear along the reel.

If you want to display a different Storyboard, press the 'v' arrow on the right of *reel* to display more options (see screen shot), then tick a reel to open it.

You can now scroll along the reel, preview process settings on timeline clips, then apply them if required.

Previewing a Process

Hold down the cursor on any tile to preview these settings on the current timeline clip. Release cursor pressure to hide the preview. Only the settings for the current process are previewed.

Applying Processes

Each Storyboard clip may contain multiple processes, eg *colour, text* and *dve*. You can then either selectively apply one of these processes or apply all processes to the current timeline clip:

selective — Position the timeline cursor over the required clip, then open a process in the GUI (eg *colour*). Press on the required Storyboard tile then slide the cursor up to apply this process in its current state (ie enabled or disabled) to the timeline clip.

all — To apply all processes in their current state (ie enabled or disabled) and from within any GUI process, position the timeline cursor over the required clip, hold down <Ctrl> and on the required Storyboard tile, slide the cursor up.

Note that a Storyboard tile containing a Stereo3D clip only displays the left eye, but both left and right eye processes are stored and subsequently applied.

Saving, Loading & Deleting a Storyboard

During a grading project, you can save multiple Storyboards as required. These can then be used on other projects. Do this by selecting the *save* box in the bottom-left of the menu area, then select *storyboard* in the pop-up and enter a name. The Storyboard is saved in the Clips Bin and consists of 1 frame for each segment plus all processes and keyframes, which also makes archiving more efficient.

To load a Storyboard (or you can load an edit with processes), so that you can preview/transfer processes to the current project, drag the Storyboard from the Clips Bin and drop it either on the reel display area, or over one of the '*empty*' slots in the Storyboard list. Alternatively, you can drop it over an existing Storyboard in the list to overwrite the existing entry. The new Storyboard's name now appears in the list. You can load a maximum of 6 Storyboards in addition to the current '*main*' Storyboard.

To delete a Storyboard from the reel list only (not the Clips Bin), press *delete* followed by the Storyboard name in the list: you cannot delete the '*main*' Storyboard. To delete a Storyboard from the Clips Bin, select its title in the bin and press *delete* from the column on the right.

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Display & Lock Options

Deselect *reel* to hide the Storyboard. To disable the current Storyboard but not the reel display, deselect it via its tick box. Tick *reel* and *show* to display the Stillstore.

By default, the Storyboard is 'unlocked' in relation to the timeline edit. In this mode (ie the *lock* box is not ticked), the Storyboard tiles initially correspond to the clip segments on the timeline but do not scroll with the timeline automatically. This is useful if, for example a process from a clip near the end of the Storyboard needs to be applied to a segment on the timeline that is nearer the start. You can scroll through the Storyboard using the bar on the right in this mode.

If required, tick the *lock* box to synchronise the 'main' Storyboard (you cannot lock a different one) with the timeline, so that during navigation they move together.

Timecode Display

Press on any Storyboard tile's timecode display to switch between destination timecode, source timecode (src) and time of day (tod). Note that timecodes must be enabled in the <F1> Configuration Window's *Clips* menu first.

Cursor & Frame Colours

A Storyboard clip that contains the current MLT FX process is indicated by the graduated blue outline around the tile. For example, a blur process is indicated when *blur* is open in the GUI, but not when *dve* is open.

The current timeline cursor position is indicated in the Storyboard by the graduated orange outline around the tile. This obscures any other type of clip outline. This turns to graduated yellow if part of a clip group.

A clip segment that is part of the current group is indicated with a cyan outline around the tile (see 'Applying Group Grades' previously in this chapter).

Navigating & Zooming

Press on any Storyboard frame and drag left or right or use the arrow keys to step through the reel.

If the Stillstore and Storyboard are both displayed, the Stillstore is displayed above the Storyboard. Both the Storyboard and Stillstore have an icon on the top-right of each display which highlights green to indicate which has current focus (ie which is currently selected/active).

You can drag the icon up or down to increase or decrease the area of the display. Press the icon to return to the default size.

In unlocked mode, use the scroll bar on the right to navigate through the contents and press and hold <Alt> then drag the icon to zoom in/out.

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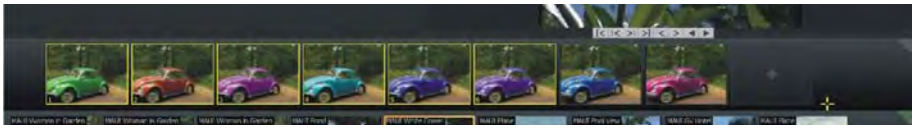
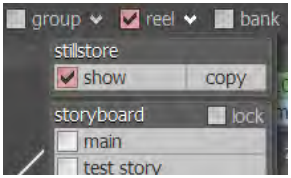
Stillstore



Processes can be selectively or globally applied from the Stillstore to the current timeline clip or transferred from one project to another. You can apply several different settings for a process eg *colour* to the same frame of a clip and then, each time a change is made, save the still into the Stillstore and compare them next to each other.



Tick the *reel* box then press the 'v' arrow on the right. Below *stillstore* tick *show*. Stills now appear above the Storyboard (if enabled) and below the Edit Window. Current stills are indicated by a yellow outline on the display and are numbered 1-6 (although more can be added and displayed).

Stereo3D Stillstore Clips

If the Stillstore contains Stereo3D clips, the left eye only is displayed, although both left and right eye processes are stored and can subsequently be applied.

Previewing a Process

Hold down the cursor on any tile to preview these settings on the current timeline clip. Release cursor pressure to hide the preview. Only the settings for the current process are previewed.

Applying Processes

Each Stillstore clip may contain multiple processes, eg *colour, text* and *dve*. You can then either selectively apply one of these processes or apply all processes to the current timeline clip:

selective — Position the timeline cursor over the required clip, then open a process in the GUI (eg *colour*). Press on the required Stillstore tile then slide the cursor up to apply this process in its current state (ie enabled or disabled) to the timeline clip.

all — To apply all processes in their current state (ie enabled or disabled) and from within any GUI process, position the timeline cursor over

the required clip, hold down <Ctrl> and on the required Stillstore tile, slide the cursor up.

Note that a Stillstore tile containing a Stereo3D clip only displays the left eye, but both left and right eye processes are stored and subsequently applied.

Saving a Set of Stills

To save the current set of stills, press *copy* in the *reel* menu. A Floating Clip appears that can then be dragged to the desktop or saved in the Clips Bin with '*Stillstore Clip*' as the default name.

Loading Previously Saved Stills

You can drag a saved set of stills from the Clips Bin and drop it onto the Stillstore reel display or the *show* box in the *reel* menu.

Transfer from Settings Bin to Stillstore

Settings can be dragged from the Settings Bin and inserted anywhere within the current Stillstore for future use. Open the Settings Bin, drag the setting from the bin and then drop it over the required position (indicated by the yellow highlight) on the Stillstore reel. The frame with its settings is now inserted into the Stillstore.

Adding New Stills (+)

After you have made a process change, save the new still to the Stillstore by pressing the '+' frame on the reel display.

Deleting Stills

To delete a still, press *delete* then the required still on the reel display. To delete a set of stills, press delete followed by the *show* box on the reel menu.

Navigating & Zooming

See 'Storyboard – Navigating & Zooming' for details of viewing the Stillstore reel.

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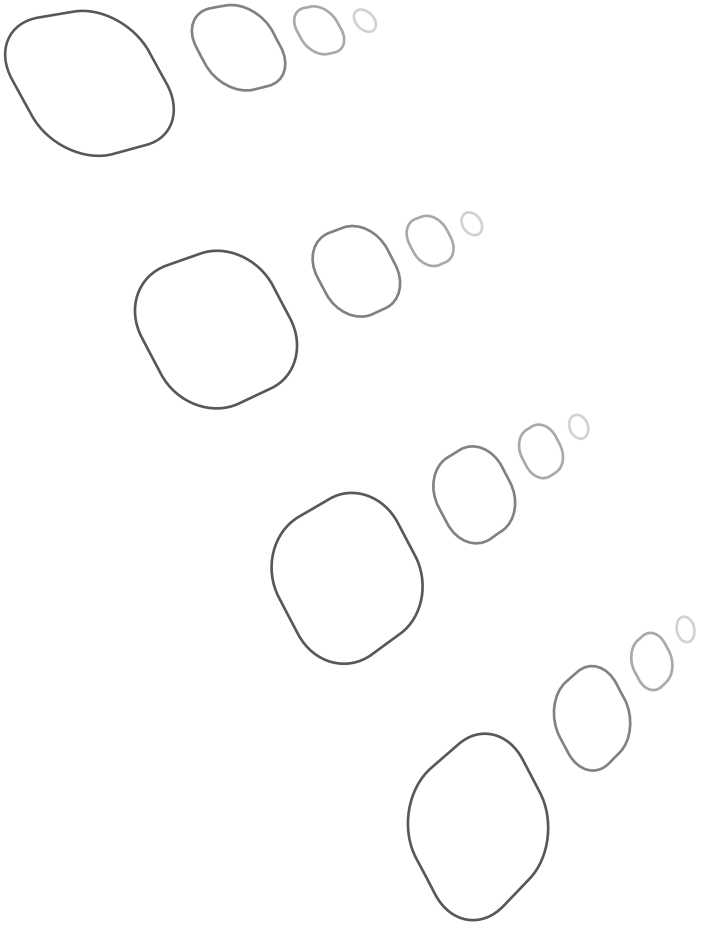

2

NeoNano

The NeoNano panel provides a compact, portable and ergonomic user interface for colour grading on various workstations within or outside of the main grading suite.

Note that NeoNano should be used in conjunction with a standard keyboard and mouse.

Overview

Introduction

The NeoNano panel provides a compact, portable and ergonomic user interface—in conjunction with a USB keyboard and mouse—for colour grading on various workstations within or outside of the main grading suite.

The panel incorporates roller ball controls, and a series of buttons and knobs with context-sensitive OLED displays.

See 'NeoNano Installation Guide' for panel details and interconnection.

Start-up

Start the Quantel kernel, then open the Edit application. The panel now displays the **Pan + Scan** OLED/rotary knob on the top-right of the panel. You can now either press this to 'on' and change Pan & Scan settings, or open MLT FX and select the *colour* process, then use the top-left rotary knob to select the required panel mode.

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Edit Interaction

The panel can be used within the Edit application for various Pan & Scan functions on either mono or stereo media. These functions are off by default, but available by pressing the **Pan + Scan** OLED/rotary knob on the top-right of the panel to 'on'.

Note that MLT FX must be closed in order to access these panel functions.

See 'Edit – Pan & Scan/3D Control Functions' throughout this chapter for details.

MLT FX Interaction

The panel is mostly used within the MLT FX – *colour* process. There are various colour and DVE modes available on the panel that fully interact with the MLT FX GUI. When moving between timeline segments, the panel mode changes to the most recent panel mode used on that segment.

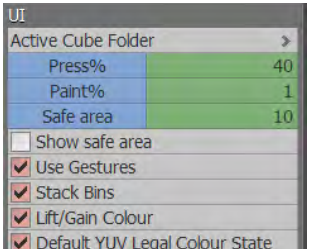
See 'Switching Modes via Panel (MLT FX)' later in this chapter for details of switching between modes.

Stereo3D Functions

Stereo3D panel functions such as *vergence* are noted in this guide. For more details, plus all stereo GUI functions and workflow, see the 'Stereo3D User Guide'.

See 'Stereo3D User Guide' for more details.

<F1> Settings

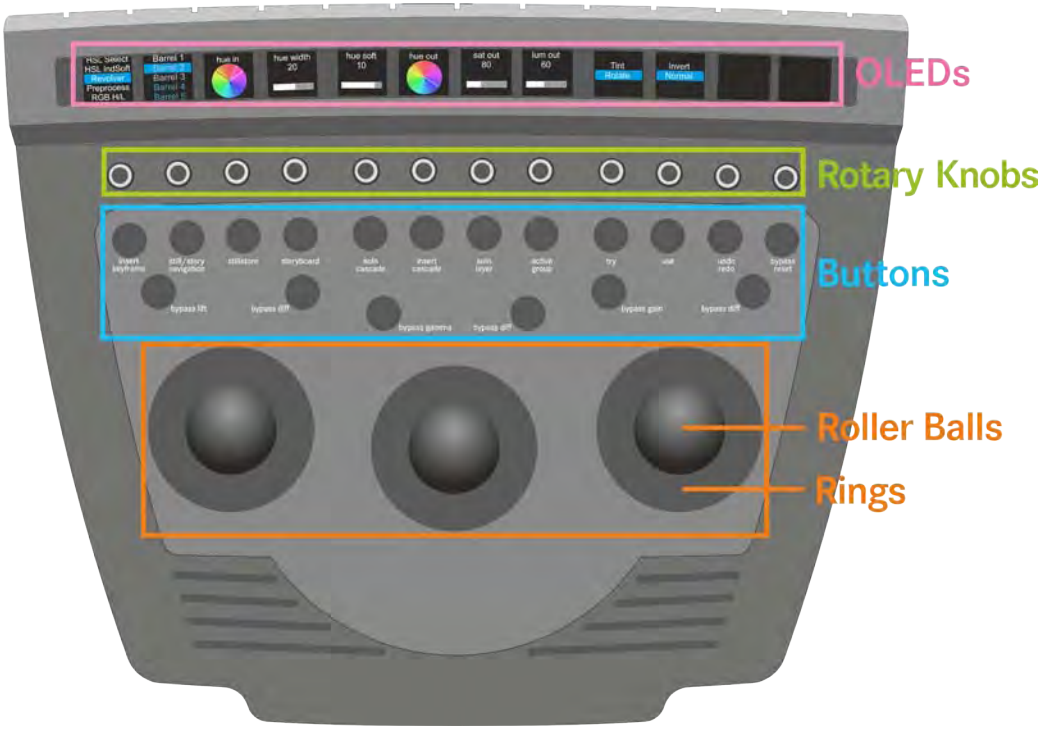


When the Quantel kernel has been launched, you must press <F1> to display the Configuration Window.

In the *UI* menu, tick the *Lift/Gain Colour* box to ensure that you can use all Nano panel controls.

Panel Layout

Many of the panel's controls and displays are context-sensitive, depending on the current panel or GUI mode and on user settings. Panel functions are detailed throughout this chapter.



See 'OLEDs & Rotary Knobs' for these control functions.
See 'Buttons' for these control functions.
See 'Roller Balls & Rings' for these control functions.

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Remapping Panel Functions

Nano Configuration Window

Panel functions can be remapped to different controls on the panel. If you press <Ctrl>+<Shift>+<F11> the 'NeoNano Configuration' window appears.

This window enables user configuration of the panel including: ring/roller ball sensitivity, gearing and direction (available in a pop-up displayed by pressing within the outer ring on any GUI rotary/roller ball); plus mapping of all functions (except the **'Mode Selector'** rotary) within their individual menus. Global parameters such as display brightness can also be set here.

You cannot remap the 'Mode Selector' rotary on the top-left of the panel.

Remap a function by doing one of the following:

a Select the required function via the GUI and press *Wipe Display* to simply

'remove' the item. Note that the function will not actually be deleted, but is listed in the *Additional Params* pane on the bottom left of the screen.

b Using the GUI, drag the required function to any new position on the panel. If an existing function is in this position, it will be placed in the *Additional Params* pane and overwritten by the 'new' function.

c To copy a function, drag the required item to any new position and press <Ctrl> before dropping it.

A history of the current changes is listed in the *Current Changes* pane on the bottom of the screen. Any item in this list can be 'undone' by clicking on the '*X*' towards the top-right of the item.

The new configuration is saved automatically and recalled on start-up. By default an xml config file is saved in the C:\Data\User\Neo directory with the title NeoNanoConfig.xml.

If you want to rename the config file, click on the C:\Data\User\Neo drop-down menu at the top of the screen and rename the file as appropriate.

Press *Reset All Changes* to return to the default configuration.

After adjusting any item in the *Global Params* menu, reboot the Quantel kernel (press <Ctrl>+<F5>). All other remapping adjustments are dynamic and do not require a reboot.

Note that on boot-up NeoNano tries to locate the config file in the root of any USB devices and then the path above. If the config file cannot be found here, the default configuration is used.

Foot Pedal (option)

An optional USB connected foot pedal can be obtained by the customer and then programmed to be any key: usually as the <Ctrl> key. Note that the footpedal is sourced and purchased by the customer and is not supported by Quantel.

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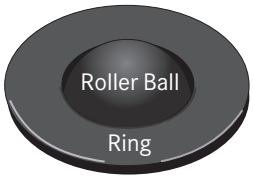
Roller Balls & Rings

Overview

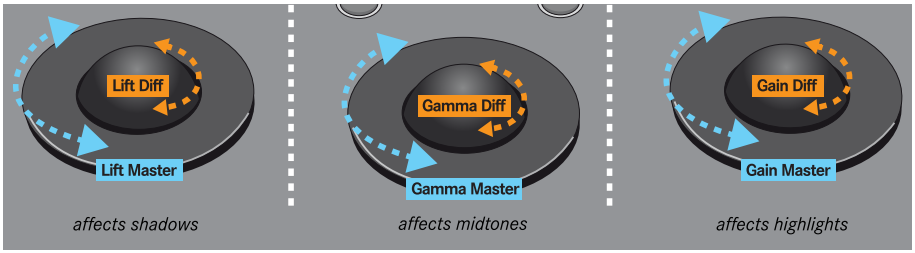


The three roller balls across the centre of the panel are usually used to adjust lift, gamma and gain differential. Outer rings on each ball provide a master control. There is also roller ball functionality within specific modes such as DVE, described later in this section.

To activate this functionality, ensure that *Lift/Gain Colour* is ticked in the <F1> Configuration Window's *UI* menu.

MLT FX

Colour Functions



Each roller ball affects colour differential, ie each colour component can be adjusted separately. Moving the left ball adjusts the image's lift (shadows); the middle ball adjusts gamma (midtones); and the right ball adjusts gain (highlights).

Each roller ball has a ring around the outside. This is the master control; rotating it allows all colour components to be adjusted together.

You can use a roller ball's associated 'bypass' buttons to bypass or reset either the master or differential value. See 'Buttons – MLT FX – Colour Bypass/Reset' in following section for more details.

Locking Lift & Gain

If you tick the *lock* box in the GUI, lift and gain can be controlled together by using the left ball and ring.

Changing Roller Ball Vectors

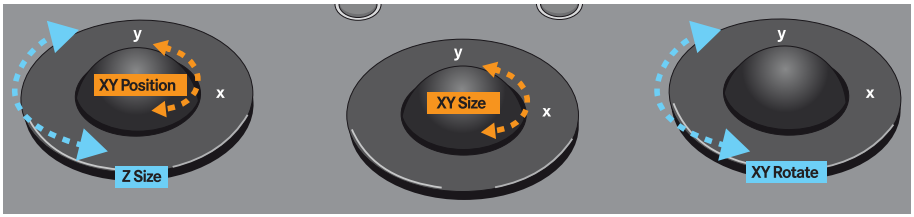
The corresponding ring display in the *mlt fx – colour* menu shows roller ball adjustments graphically.

If you tick the *vectors* box in the centre of the MLT FX menu area, you can change the angle at which colours are distributed around the roller ball via the pop-up. Colour order from left to right is always green, red then blue.

With the top scroll box set to *Low/Mid/High (GRB)* you can set the angle of these colours to either *90˚*; *120˚* for an even distribution; or *VScope* so that colours correspond to a vectorscope graticule.

Alternatively, from the top scroll box, select *Custom Angle* then enter a required angle in the numeric box below.

DVE Functions



If you select **DVE** mode on the panel, the roller ball functions change as shown in the diagram. These functions are also available with *mlt fx – dve* selected in the GUI.

Alternatively, if you want to remain within the *mlt fx – colour* process, you can hold down <Ctrl> to toggle DVE roller ball functions on temporarily.

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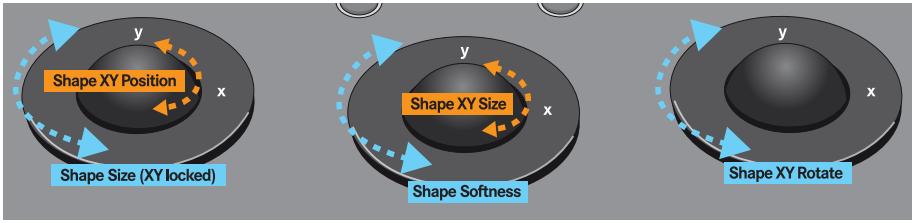
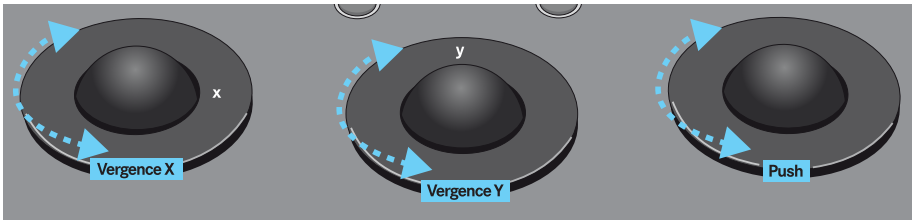
Shapes Functions



If you select **Shapes** mode on the panel, the roller ball functions change as shown in the diagram and the GUI automatically opens the *colour – selective – shaped* menu. These functions are also available with *mlt fx – graphics* selected in the GUI.

Vergence Functions

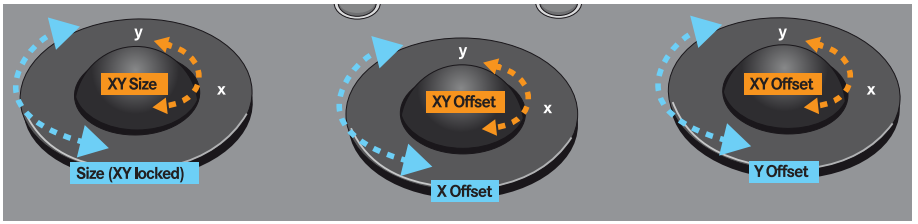
For the following functionality, you must have stereo media loaded on the timeline and *stereo – vergence* selected in MLT FX. All OLEDs and rotary knobs now change—see 'Vergence (GUI Menu)' later in this chapter—and the panel rings do the following:



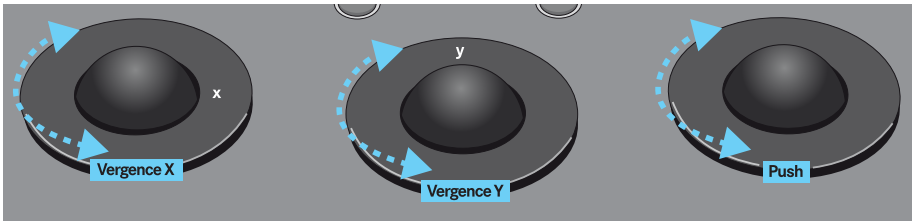
Edit

Pan & Scan/3D Control Functions

With MLT FX closed, turn Pan & Scan on by pressing the **Pan + Scan** panel rotary knob on the top-right to 'on'. The panel OLEDs now display applicable mono or stereo functions, depending on the current clip. Some of the panel's button functionality now changes (see 'Buttons' later in this chapter) in addition to the following roller ball functionality:



With Stereo3D media, a **3D Control** OLED/rotary knob automatically appears. Press this to 'on' which changes functionality as follows:



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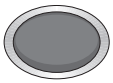
Buttons

Overview



Buttons allow functions to be toggled, which may also change the functionality of rotary knobs and the display of the OLEDs.

In general, a button performs the following when you press or hold it down:

press toggle function on/bypass
hold down reset function.

Illumination & Brightness

In **Home** mode, the brightness of the button rings can be controlled. Hold down <Ctrl> and turn the second rotary knob on the top-left of the panel (you can use the first knob on the top-left to adjust OLED display brightness).

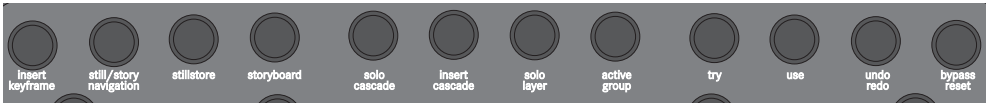
The button's outer ring illuminates to reflect its current status:

white indicates when the function is on/enabled (via button press)
blue indicates when the function is off/disabled but available (via button press)

deep yellow indicates an active group of clips or still/storyboard navigation.

No illumination indicates that the function is not available within the current mode, eg in **DVE** panel mode, the bypass buttons above the roller balls cannot be used, so they do not illuminate.

Global Functions



These buttons are generally available (when illuminated blue) across various GUI/panel modes. Press a button once to enable it: press again to disable it. The buttons shown in this diagram do the following (from left to right on the panel):

insert keyframe	With the GUI *edit* mode on, this button will illuminate as a reminder to manually insert a keyframe when a parameter is changed. Press this button to manually insert a keyframe for all active parameters; press and hold to insert a keyframe for ALL parameters. (Note that with the GUI *auto* mode on, a new keyframe is inserted automatically when a parameter is changed).
still/story navigation	Press to toggle rotary knob/OLED display to the Stillstore or Storyboard functions (depending on which was most recently used).
stillstore	Press to open the Stillstore in the GUI. Hold down <Shift> and press this button to delete the whole Stillstore.
storyboard	Press to open the Storyboard in the GUI.
solo cascade	Press to view the selected cascade only. Hold down to reset the current cascade's colour settings. Hold down <Ctrl> and press to rename the current cascade via the pop-up.
insert cascade	Press to add a new Cascade level.
solo layer	Press to view the selected layer only (ie 'solo'). The OLED text turns green to indicate this. With stereo media, press <Ctrl> and this button to display extra functionality (see 'Applying Eye Processes' later in this chapter for details).
active group	Press to toggle through groups (current group is indicated on the GUI timeline). Hold down to create a new group from the current selection.
try	Press to preview the clip with current Stillstore/Storyboard parameters applied. Hold down to extend/prolong the preview.
use	Applies current Stillstore/Storyboard parameters to the clip.
undo/redo	Press to undo the previous action (do this multiple times for multiple undo levels). Hold down to redo

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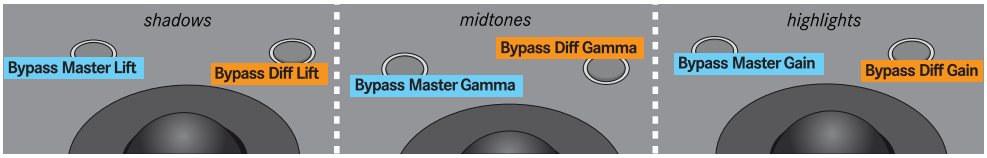
the previous action (do this multiple times for multiple redo levels).

bypass/reset Press to toggle all processes on/off. Hold down to reset the current process.

MLT FX

Colour Bypass/Reset



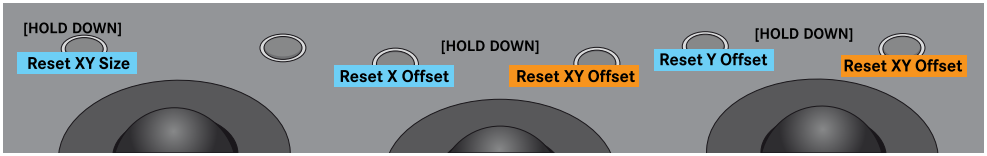
Each roller ball has two associated buttons above, as shown in the diagram. You can do the following on a button:

press bypass toggle for master parameters or differential (individual) parameter

hold down reset master parameters or differential parameter to defaults.

Edit

Pan & Scan/3D Control Functions

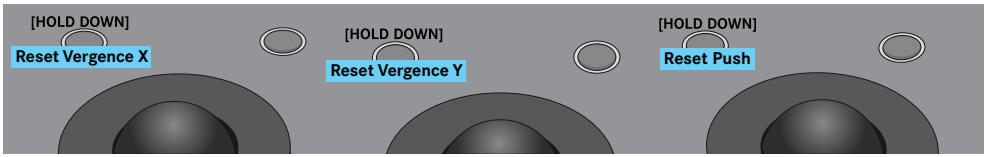


With MLT FX closed, turn Pan & Scan on by pressing the **Pan + Scan** panel rotary knob on the top-right to 'on'. The panel OLEDs now display applicable mono or stereo functions, depending on the current clip. The roller ball functionality now changes (see 'Roller Balls & Rings' previously in this chapter) in addition to the panel buttons shown in these diagrams. You can do the following on a button:

hold down reset Pan & Scan size/offset.

With Stereo3D media, a **3D Control** OLED/rotary knob automatically appears. Press this to 'on' which changes button functionality as follows:

hold down reset vergence/push.



In this mode, the **bypass/reset** button on the right of the panel can also be used as follows:

press resets Pan & Scan
hold down deletes Pan & Scan keyframes.

See 'Pan & Scan' in the Editing User Guide and the Stereo3D User Guide for more details of GUI functions.

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OLEDs & Rotary Knobs

OLED Overview

The image displays use OLEDs, which provide high quality images visible from any angle. The displays are context sensitive; they indicate the current function of the associated rotary knob.

Illumination & Brightness

With **Home** mode selected on the panel, the brightness of the OLED displays can be controlled. Hold down <Ctrl> and turn the first rotary knob on the top-left of the panel (you can use the second knob on the top-left to adjust button ring brightness).

Rotary Knob Overview

Each rotary knob's function varies according to the current GUI/ button selection; this is indicated by the associated OLED directly above. Knobs have an integral light which allows them to be seen in low light conditions.

In general, a rotary knob performs the following when you turn, press or hold it down:

turn	(left): decrease value/scroll up (right): increase value/scroll down
press	bypass value (press again to show value)
hold down	reset value to default/delete list item (where permitted)

Keyboard Modifiers

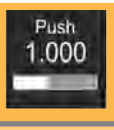
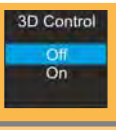
Some rotary knobs have extra functionality by holding down <Ctrl>, <Shift> or other modifiers: these are described throughout this chapter where applicable.

Edit

Pan & Scan/3D Control Functions

Edit menu: 'Pan & Scan'. Note that MLT FX must be closed. Panel functions that appear automatically with a Stereo3D clip are indicated below in an orange block. The rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	adjust x size	adjust y size	adjust x offset	adjust y offset	adjust x vergence	adjust y vergence
press						
<Ctrl>+ press						
hold down	reset x size	reset y size	reset x offset	reset y offset	reset x vergence	reset y vergence

						
turn	adjust push				apply Pan & Scan to current seg or track	
press				3D panel ring functions on/off		Pan & Scan panel & GUI functions on/off
<Ctrl>+ press						
hold down	reset push					

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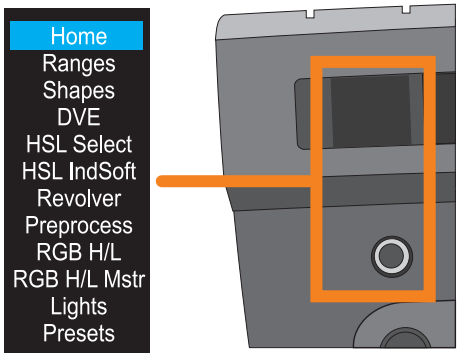
Switching Modes via Panel (MLT FX)

Throughout this section, it is assumed that panel functions are in their default mapped positions.



You must be in the MLT FX *colour* process in order for these mode options to appear in the top-left OLED on the panel.

Turn the '**Mode Selector**' rotary on the top-left of the panel to set the required mode (the default is **Home**). The panel controls and OLEDs now change accordingly. Note that you cannot remap this rotary knob.

You can use the rotary as follows:

Turn	Move up/down through mode list.
Press	Toggle **Home** (default) mode/most recent mode.
<Ctrl>+Press	Toggle **Presets** mode/most recent mode.
Hold down	Resets all parameters for current mode, except **Ranges** mode, which resets the GUI graph only.

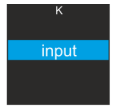
When the MLT FX *stereo – vergence* menu is selected with stereo timeline media, the 'Mode Selector' rotary temporarily changes to an 'x vergence' control (see end of this chapter for details).

If the panel is in idle mode, press the 'Mode Selector' to re-activate it.

Home (default)

MLT FX menu: *colour – primary* (also available in other colour menus without panel functions assigned, eg *Fettle*).

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

						
turn	select mode	adjust saturation	adjust s-curve	adjust sharpness/ softness	select cascade	select input cascade
press	home mode/ recent mode	saturation off/on	s-curve off/on	aperture off/on	cascade off/ on	use key created (K) off/on
<Ctrl>+ press	presets mode/ recent mode				**+ <Shift>** insert cascade	
hold down	reset mode	reset saturation	reset s-curve	reset aperture	delete current cascade	

turn	select track (*3D functions in next section)*	select group	storyboard/ stillstore wipe up left/wipe down right	rotate wipe	select action for current Stillstore item	select inside/ outside area
press	mute track (turns red)/ show track (*3D in next section)*		wipe off/on	vertical wipe/ horiz. wipe	activate action (insert, add, replace or delete)	inside or outside off/ on
<Ctrl>+ press	toggle track FX/seg FX **+ <Shift>** *(3D in next section)*	rename current group				
hold down	delete current track (*3D functions in next section)*	delete current group	try still/ storyboard/ current frame	reset vertical		delete inside or outside effect

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Selecting/Enabling Eyes

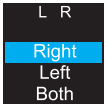
In MLT FX, the 'track' OLED indicates numbered mono and stereo timeline tracks that you can toggle through, solo or delete via the rotary knob (see previous table). With mono media, the L and R at the top of the display are greyed-out.

With stereo media in MLT FX, the L and R at the top illuminates (they are greyed-out with mono media). This allows you to mute/solo an eye on the current track by holding down <Shift> then pressing the 'track' rotary knob to toggle between L , R, or L and R together (see screen shot). Alternatively, hold down <Shift> and <Ctrl> then press the 'track' rotary knob to toggle between L or R only (not L and R together).

Each *L* or *R* box (below the GUI Edit Window) and on the panel display turns pink when an eye is enabled, and the Edit Window image updates accordingly.

Note that both eyes are displayed in the Edit Window and on the output by default. You cannot mute both L and R together.

Applying Eye Processes



With stereo media in MLT FX, you can insert processes (eg colour) on the left eye, right eye or both eyes via the panel.

Press <Ctrl> and the **solo layer** button to switch the 'track' rotary knob to MLT FX 3D mode (press this later to return to normal track mode):

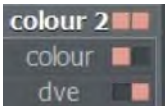
1. Choose the process or menu you require either from the panel or by selecting the process in the GUI, eg *colour*.

2. Turn the rotary knob to the required track eg Right, then push and hold it to set the process for only the right eye.

3. Perform the required process changes; notice the GUI now displays a pink box for the right eye to indicate a change has been made.

4. While still within the same process (*colour* in this example), you can now choose the left eye via the track selector knob; a second process (*colour 2*)

now displays in the GUI above the first one. Perform the changes as required and if necessary create a third process for both eyes.



You can now use the rotary knob to move between processes. If more than 3 processes are created, only the first Left, Right or Both process in the stack can be selected via the panel knob; to select subsequent processes, eg *colour 2, colour 3,* select the process via the GUI.

See 'Stereo3D User Guide' for more details of panel and GUI functions.

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Ranges

MLT FX menu: *colour – primary* (also available in other colour menus without panel functions assigned, eg *Fettle*).

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	select range (max 12 custom)	enable/ select ranges graph type	adjust range shadow 1 vector	adjust range shadow 4 vector	adjust range highlight 1 vector
press	home mode/ ranges mode	range off/on	graph off/on			
<Ctrl>+ press	presets mode/ ranges mode	rename ra. **hold down:** delete ra. **turn:** reorder ra..				
hold down	reset range graph only	save current range	reset current graph	reset range shadow 1	reset range shadow 4	reset range highlight 1

turn	adjust highlight 4 vector	select roller ball range mode	adjust range shadow saturation	adjust range midtone saturation	adjust range highlight saturation	adjust range hue
press			range shadow saturation off/on	range midtone saturation off/on	range highlight saturation off/on	range hue off/on
<Ctrl>+ press						
hold down	reset range highlight 4	reset range grade	reset range shadow saturation	reset range midtone saturation	reset range highlight saturation	reset range hue

Shapes

MLT FX menu: *colour – selective – shaped graphics*

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	select key mode	select shape interaction	select shape	adjust shape x position	adjust shape y position
press	home mode/ shapes mode		invert shape interaction	all shapes off/on	original shape x position/ current x position	original shape y position/ current y position
<Ctrl>+ press	presets mode/ shapes mode			rename shape		
hold down	reset mode			delete current shape	reset shape to original x position	reset shape to original y position

turn	adjust shape xy size	adjust square or rect. width/ ellipse x radius	adjust rect. height/ellipse y radius	adjust shape angle	adjust shape opacity	adjust shape softness
press	original shape xy size/ current xy size	original shape width/current width	original shape height/current height	original shape angle/current angle	original shape opacity/ current opacity	original shape softness/ current softness
<Ctrl>+ press						
hold down	reset shape to original xy size	reset shape to original width	reset shape to original height	reset shape to original angle	reset shape to original opacity	reset shape to original softness

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DVE

MLT FX menu: *colour – primary*
dve

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	adjust global opacity	adjust global softness			
press	home mode/ DVE mode	global invert off/on	original global softness/ current global softness			DVE off/on
<Ctrl>+ press	presets mode/ DVE mode					
hold down	reset mode	reset opacity only	reset global softness			reset DVE

turn	adjust x position	adjust y position	adjust x size	adjust y size	adjust xy size	adjust rotation
press	original x position/ current x position	original y position/ current y position	original x size/ current x size	original y size/ current y size	original xy size/current xy size	original rotation/ current rotation
<Ctrl>+ press						
hold down	reset x position	reset y position	reset x size	reset y size	reset xy size	reset rotation

HSL Select

MLT FX menu: *colour – selective – quick key*

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	select key mode	adjust hue centre	adjust hue width	adjust saturation low level	adjust saturation high level
press	home mode/ HSL Select mode	invert selection	hue centre off/on	hue width off/on	saturation low off/on	saturation high off/on
<Ctrl>+ press	presets mode/ HSL Select mode					
hold down	reset mode		reset hue centre	reset hue width	reset saturation low	reset saturation high

turn	adjust luminance low level	adjust luminance high level	adjust global softness	adjust key blur	grow/shrink key	adjust key softness
press	luminance low off/on	luminance high off/on	original global softness/ current global softness	key blur off/on	key grow off/on	key softness off/on
<Ctrl>+ press						
hold down	reset luminance low	reset luminance high	reset global softness	reset key blur	reset key grow	reset key softness

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HSL IndSoft

MLT FX menu: *colour – selective – quick key*

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	select key mode	adjust ind. hue centre	adjust ind. hue width	adjust ind. saturation low level	adjust ind. saturation high level
press	home mode/ HSL IndSoft mode	invert selection	ind. hue centre off/ on	ind. hue width off/on	ind. saturation low off/on	ind. saturation high off/on
<Ctrl>+ press	presets mode/ HSL IndSoft mode					
hold down	reset mode		reset ind. hue centre	reset ind. hue width	reset ind. saturation low	reset ind. saturation high

turn	adjust luminance ind. low level	adjust ind. luminance high level	adjust ind. global softness	adjust ind. key blur	grow/shrink key	adjust key softness
press	ind. luminance low off/on	ind. luminance high off/on	ind. original softness/ current softness	ind. key blur off/on	key grow off/on	key softness off/on
<Ctrl>+ press						
hold down	reset ind. luminance low	reset ind. luminance high	reset ind. global softness	reset ind. key blur	reset key grow	reset key softness

Revolver

MLT FX menu: *colour – revolver*

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	select barrel	adjust input hue	adjust hue width	adjust hue soft	adjust output hue
press	home mode/ Revolver mode	current barrel off/on	input hue off/on	hue width off/on	hue soft off/ on	output hue off/on
<Ctrl>+ press	presets mode/ Revolver mode					
hold down	reset mode	reset current barrel	reset input and output hue	reset hue width	reset hue soft	reset output hue

turn	adjust output saturation	adjust output luminance	select hue range	invert or normal selection		
press	output saturation off/on	output luminance off/on		invert off/on		
<Ctrl>+ press						
hold down	reset output saturation	reset output luminance				

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Preprocess

MLT FX menu: *colour – preprocess*

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	select 3D LUT/Cube	adjust minimum density*	adjust maximum density*		
press	home mode/ Preprocess mode		DMin off/ on*	DMax off/ on*	convert on/ off*	
<Ctrl>+ press	presets mode/ Preprocess mode					
hold down	reset mode		reset DMin*	reset DMax*		

Scrolling through the list automatically previews the cube effect on the current segment in the Edit Window. When the segment is rendered, the cube is 'burnt in'.

***DMin/DMax** and **Convert** options above only appear if the clip has log data. Selecting **Convert** converts log-based material to a linear image. Although rarely used, the **DMin/DMax** values can be specified (see 'Applying Colour Cubes' in chapter 1 for more details).

See 'Applying Colour Cubes' in chapter 1 for how to create, modify and apply a cube. See Appendix for details of modifying FilmLook parameters.

RGB H/L

MLT FX menu: *colour – primary*

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	adjust red lift	adjust green lift	adjust blue lift	adjust red gamma	adjust green gamma
press	home mode/ RGB H/L mode	red lift off/ on	green lift off/on	blue lift off/ on	red gamma off/on	green gamma off/ on
<Ctrl>+ press	presets mode/ RGB H/L mode					
hold down	reset mode	reset red lift	reset green lift	reset blue lift	reset red gamma	reset green gamma

turn	adjust blue gamma	adjust red gain	adjust green gain	adjust blue gain		
press	blue gamma off/on	red gain off/ on	green gain off/on	blue gain off/on		
<Ctrl>+ press						
hold down	reset blue gamma	reset red gain	reset green gain	reset blue gain		

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RGB H/L Master

MLT FX menu: *colour – primary*

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	adjust RGB master lift	adjust RGB master gamma	adjust RGB master gain		
press	home mode/ RGB H/L Master mode	RGB master lift off/on	RGB master gamma off/ on	RGB master gain off/on		
<Ctrl>+ press	presets mode/ RGB H/L Master mode					
hold down	reset mode	reset RGB master lift	reset RGB master gamma	reset RGB master gain		

Lights

MLT FX menu: *colour – lights*

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	adjust density	adjust red light	adjust green light	adjust blue light	
press	home mode/ Lights mode	density off/ on	red light off/ on	green light off/on	blue light off/on	
<Ctrl>+ press	presets mode/ Lights mode					
hold down	reset mode	reset density	reset red light	reset green light	reset blue light	

Note that a negative value increases the cast of a specific colour when adjusting 'lights', as the controls are relative to negative film.

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Presets

MLT FX menu: *colour – primary* (also available in other colour menus without panel functions assigned, eg *Fettle*).

In this mode, the rotary knobs and OLEDs are used as follows (from left to right on the panel):

turn	select mode	select cascade	select revolver	select HSL	select fettle	select shape
press	home mode/ presets mode	apply selected cascade	apply selected revolver	apply selected HSL	apply selected fettle	apply selected shape
<Ctrl>+ press	most recent mode/ presets mode	rename ca. **hold down:** delete ca. **turn:** reorder ca.	rename rev. **hold down:** delete rev.	rename HSL **hold down:** delete HSL	rename fet. **hold down:** delete fet. **turn:** reorder fet.	rename sha. **hold down:** delete sha. **turn:** reorder sha.
hold down	reset mode	add selected cascade to presets	add selected revolver to presets	add selected HSL to presets	add selected fettle to presets	add selected shape to presets

Note that you can save a maximum of 12 presets for each function, eg Cascade. Revolver and HSL contain some sequential system presets that correspond with those in the GUI: these cannot be re-ordered or deleted.

Stillstore & Storyboard

MLT FX menu: any

In any panel mode, you can press the **still/story navigation** button on the panel to toggle these Stillstore or Storyboard functions (depending which was most recently displayed via the **stilllstore** or **storyboard** panel butttons):

turn	select mode	select mode	navigate up/ down stillstore or storyboard	navigate left/ right stillstore or storyboard		
press	home mode/ recent mode					
<Ctrl>+ press	presets mode/ recent mode					
hold down	reset mode					

turn			adjust wipe on current storyboard/ stillstore frame	rotate wipe	select action for current Stillstore item	select inside/ outside area
press			wipe off/on	vertical wipe/ horiz. wipe	activate action (insert, add, replace or delete)	inside or outside off/ on
<Ctrl>/ <Shift>			**<Ctrl> + turn** scale story reel **<Shift> + turn** scale story tile	**<Ctrl> + turn** scale stillst. reel **<Shift> + turn** scale stillst.tile		
hold down			reset wipe	reset to vertical wipe		delete inside or outside effect

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Vergence (GUI Menu)

MLT FX menu: *stereo - vergence* (you must open this menu in the GUI and have stereo timeline media).

In this menu, panel ring functions also change: see previously in this chapter. The rotary knobs and OLEDs are used as follows (from left to right across the panel):

turn	adjust x vergence	adjust y vergence	adjust push LR	adjust push L	adjust push R	adjust float LR
press	x vergence off/on	y vergence off/on	push LR off/on	push L off/on	push R off/on	float LR off/on
<Ctrl>+ press						
hold down	reset x vergence	reset y vergence	reset push LR	reset push L	reset push R	reset float LR

turn		adjust float L	adjust float R	rotate LR	rotate L	rotate R
press		float L off/on	float R off/on	rotate LR off/on	rotate L off/on	rotate R off/on
<Ctrl>+ press						
hold down		reset float L	reset float R	reset rotate LR	reset rotate L	reset rotate R

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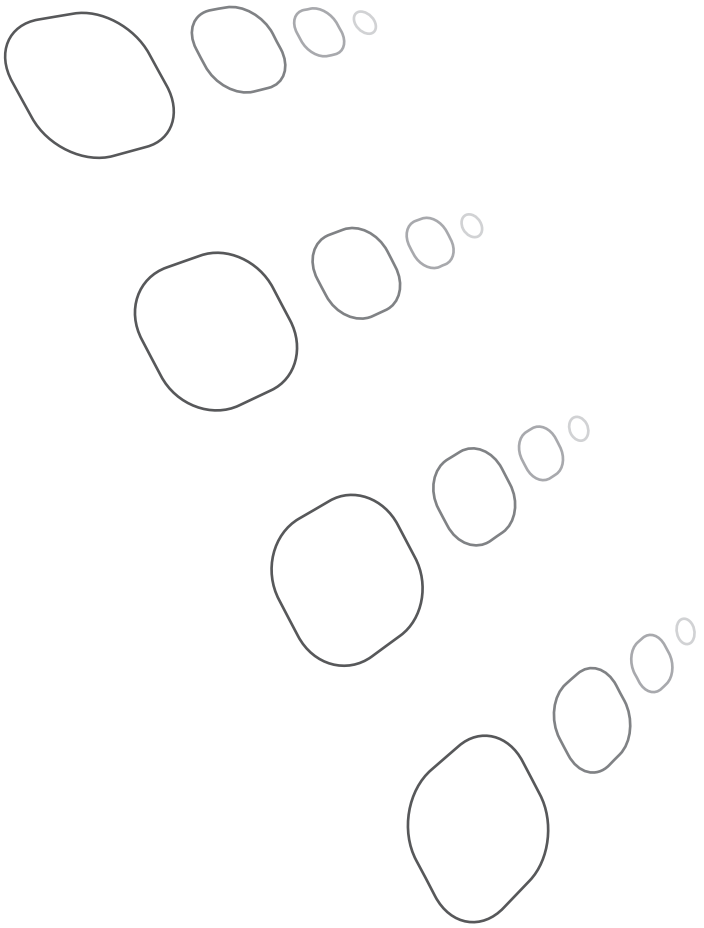

3

Neo

The Neo panel's ergonomic layout provides primary and secondary colour correction functions, transport controls plus an integral keyboard and tablet.

The OLED displays are easy to view from any angle and in low-light conditions.

Overview

Introduction

The Neo panel provides the ultimate colour correction environment. Its simple and uncluttered layout provides fast access to Pablo's comprehensive grading toolset. The OLED displays define a wide range of controls and are easy to view from any angle.

The side plates can be swapped, allowing the Neo panel to be configured for left or right handed operation.

See 'Neo Panel & Server PC Installation Guide' for panel details and interconnection.

Start-up (via GUI or Panel)

Start the Quantel kernel, then do one of the following:

to open Edit	press the *Edit* tab in the GUI, or press the **Edit** button on the right of the panel. The panel now displays the **Pan + Scan** OLED/rotary knob on the top-right of

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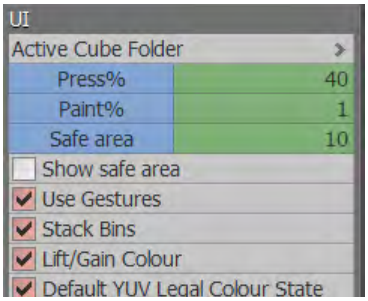
the primary grading area. You can now press this and change Pan & Scan settings if required.

to open MLT FX – colour

open the Edit application then press *mlt fx – colour* in the GUI, or hold down <Shift> then press the **Grade** button on the right of the panel. Default colour functions now appear.

<F1> Settings



When the Quantel kernel has been launched, press <F1> to display the Configuration Window.

In the *UI* menu, tick the *Lift/Gain Colour* box to ensure that you can use all Nano panel controls.

Edit Interaction

The panel can be used within the Edit application for various Pan & Scan functions on either mono or stereo media. These functions are off by default, but available by pressing the **Pan + Scan** OLED/rotary knob on the top-right of the primary grading area to 'on'.

Note that MLT FX must be closed in order to access these panel functions.

See 'Edit – Pan & Scan/3D Control Functions' throughout this chapter for details.

MLT FX Interaction

The panel is mostly used within the MLT FX – *colour* process. There are various colour and DVE modes available on the panel that fully interact with the MLT FX GUI. When moving between timeline segments, the panel mode changes to the most recent panel mode used on that segment.

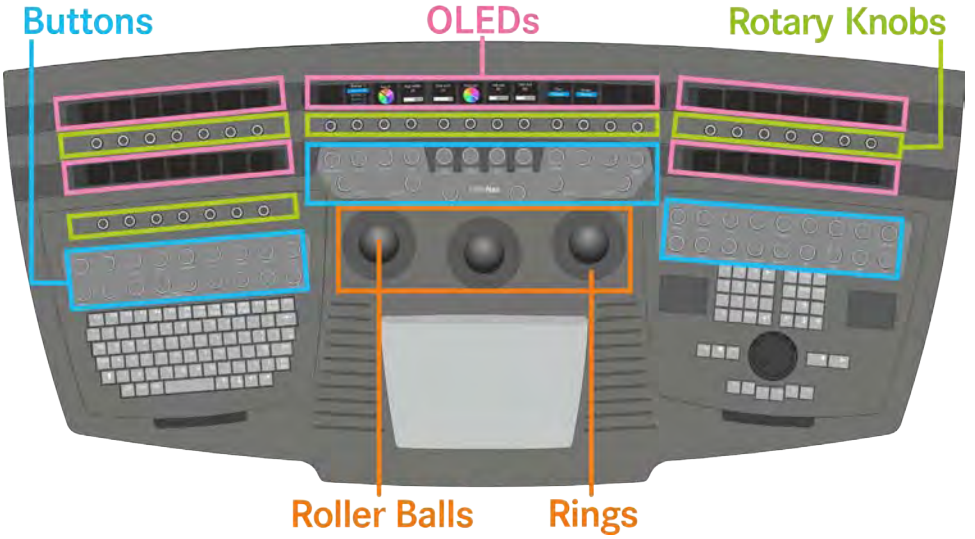
Stereo3D Functions

Stereo3D panel functions such as *vergence* are noted in this guide. For more details, plus all stereo GUI functions and workflow, see the 'Stereo3D User Guide'.

See 'Stereo3D User Guide' for more details.

Panel Layout

Many of the panel's controls and displays are context-sensitive, depending on the current panel or GUI mode and on user settings. Panel functions are detailed throughout this chapter.



See 'OLEDs & Rotary Knobs' for these control functions.
See 'Buttons' for these control functions.
See 'Roller Balls & Rings' for these control functions.

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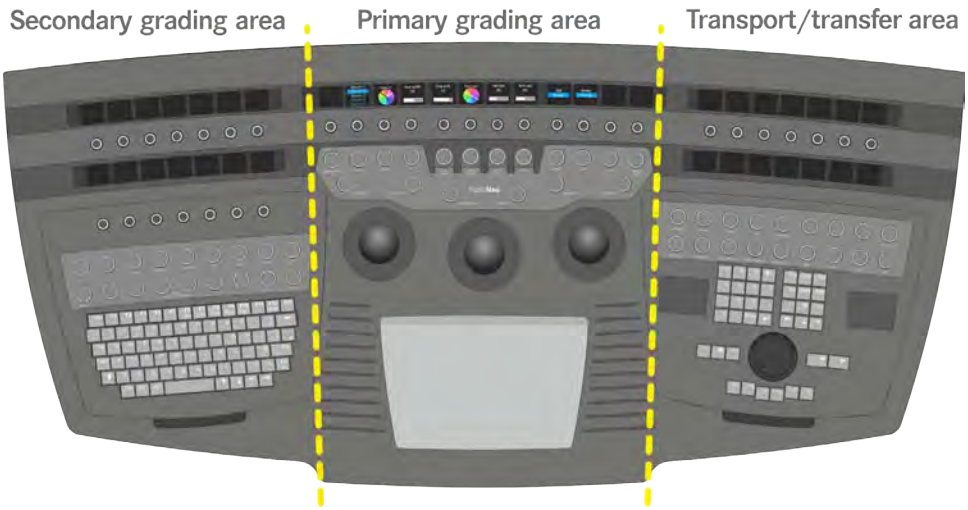
Control Areas

There are three control areas:

Primary grading	contains the main grading functions, plus tablet and roller balls across the centre of the panel.
Secondary grading	contains secondary grading functions, plus an integral keyboard across the left panel plate
Transport/transfer	contains clip navigation, reference and transfer functions plus an integral number pad across the right panel plate.

The controls in these areas are detailed throughout this chapter.

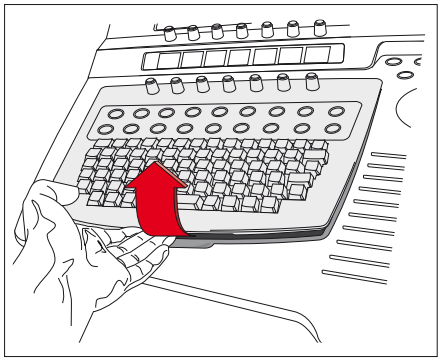


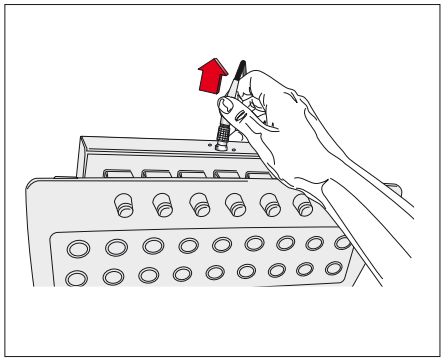
Swapping Side Plates

The secondary grading plate and the transport control plate can be swapped if required. Do the following:

1 BEFORE disconnecting the plates, always close the Quantel workstation and server PC software and remove the Neo panel and server PC's power connectors.

2 To remove a plate, lift it from the indentation in the base at the front and unplug the cable at the back.





3 Swap the plates over and plug the cables in.

4 Gently place the plates in their new positions, back edge first, ensuring that the cable is inside.

5 Plug the power connectors into the Neo panel and server PC and power-on.

6 On the workstation, open Windows and go to **Start–Programs–Quantel–[product and V#]–Settings.**

7 Select **Workstation** from the drop down menu and tick the **Keyboard On Right** box (or leave it blank if the keyboard is on the left) then select **OK** or **Apply** to action the changes.

USB Port (User Settings)

User settings can be saved onto a USB Flash Drive, via the port on the right hand side of the panel.

This port is USB 1.0 and should never be used for connecting to other systems or for transferring large image files. Separate USB ports on the back of the panel are used for connectivity: see Neo Panel & Server PC Installation Guide for details.

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Remapping Panel Functions

Neo Configuration Window

Panel functions can be remapped to different controls on the panel. If you press <Ctrl>+<Shift>+<F11> the 'Neo Configuration' window appears.

This window enables user configuration of the panel including: ring/roller ball sensitivity, gearing and direction (available in a pop-up displayed by pressing within the outer ring on any GUI rotary/roller ball); plus mapping of all functions within their individual menus. Global parameters such as display brightness can also be set here.

Remap a function by doing one of the following:

a Select the required function via the GUI and press *Wipe Display* to simply 'remove' the item. Note that the function will not actually be deleted, but is listed in the *Additional Params* pane on the bottom left of the screen.

b Using the GUI, drag the required function to any new position on the panel. If an existing function is in this position, it will be placed in the *Additional*

Params pane and overwritten by the 'new' function.

c To copy a function, drag the required item to any new position and press <Ctrl> before dropping it.

A history of the current changes is listed in the *Current Changes* pane on the bottom of the screen. Any item in this list can be 'undone' by clicking on the '*X*' towards the top-right of the item.

The new configuration is saved automatically and recalled on start-up. By default an xml config file is saved in the C:\Data\User\Neo directory with the title NeoConfig.xml.

If you want to rename the config file, click on the C:\Data\User\Neo drop-down menu at the top of the screen and rename the file as appropriate.

Press *Reset All Changes* to return to the default configuration.

After adjusting any item in the *Global Params* menu, reboot the Quantel kernel (press <Ctrl>+<F5>). All other remapping adjustments are dynamic and do not require a reboot.

Throughout this chapter, it is assumed that panel functions are in their default mapped positions.

Note that on boot-up Neo tries to locate the config file in the root of any USB devices and then the path above. If the config file cannot be found here, the default configuration is used.

Foot Pedal (option)

An optional USB connected foot pedal can be obtained by the customer and then programmed to be any key: usually as the <Ctrl> key. Note that the footpedal is sourced and purchased by the customer and is not supported by Quantel. Quantel have tested the 'Savant Elite Single Foot Switch' which functions properly in conjunction with the panel.

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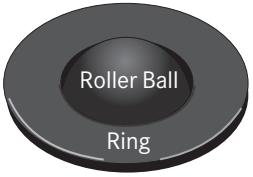
Control Type Overview

Roller Balls & Rings



The three roller balls across the centre of the panel are usually used to adjust lift, gamma and gain differential. Outer rings on each ball provide a master control. There is also roller ball functionality within specific modes such as DVE, described later in this chapter.

You can use a roller ball's associated 'bypass' buttons to bypass or reset either the master or differential value.

OLEDs & Rotary Knobs

The image displays use OLEDs, which provide high quality images visible from any angle. The displays are context sensitive; they indicate the current function of the associated rotary knob.

Each rotary knob's function varies according to the current GUI/button selection; this is indicated by the associated OLED directly above. Knobs have an integral light which allows them to be seen in low light conditions. In general, a rotary knob performs the following when you turn, press or hold it down:

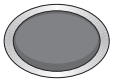
turn	(left): decrease value/scroll up (right): increase value/scroll down
press	bypass value (press again to show value)
hold down	reset value to default/delete list item (where permitted)

Some rotary knobs have extra functionality by holding down <Ctrl>, <Shift> or other modifiers: these are described throughout this chapter where applicable.

Illumination & Brightness

In any panel mode, the brightness of the OLED displays can be controlled. Hold down <Ctrl> and turn the first rotary knob on the top-left of the panel (you can use the second knob on the top-left to adjust button ring brightness).

Buttons



Buttons allow functions to be toggled, which may also change the functionality of rotary knobs and the display of the OLEDs. In general, a button performs the following when you press or hold it down:

press toggle function on/bypass
hold down reset function.

Illumination & Brightness

In any panel mode, the brightness of the button rings can be controlled. Hold down <Ctrl> and turn the second rotary knob on the top-left of the panel (you can use the first knob on the top-left to adjust OLED display brightness).

No illumination indicates that the function is not available within the current mode, eg in **DVE** panel mode, the bypass buttons above the roller balls cannot be used, so they do not illuminate.

The button's outer ring illuminates to reflect its current status:

white indicates when the function is on/enabled (via button press)

blue indicates when the function is off/disabled but available (via button press)

deep yellow indicates an active group of clips or still/storyboard navigation.

red or orange keyframe auto/edit (manual) mode

If there are preset colours displayed in the GUI, eg for Revolver, these are indicated on the preset panel buttons but can be overwritten with a new colour.

See 'Saving & Using Presets' later in this chapter for more details.

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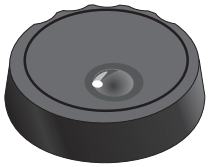
Jog Wheel



A jog wheel is located in the transport/transfer area. Rotate clockwise to move forwards along the timeline edit, or anticlockwise to move backwards. The outer wheel shuttles; the inner wheel jogs.

Keys

Key characters are illuminated to allow visibility in low light conditions.

Letter, Number & Transport Functions

Keyboard — The secondary grading area contains a QWERTY keyboard that can be used for naming cascades, presets or clips etc. The keyboard is also used for modifiers including <Ctrl> and <Shift>: modifier combinations are described throughout this guide with applicable panel functions.

Number pad — This is used for general numeric entry (eg numbering a cascade or shape etc) and also for navigation within Stillstore and Storyboard mode.

Transport — Keys surrounding the jog wheel allow you to play/stop the current clip, or navigate backwards/forwards along the timeline.

Tablet

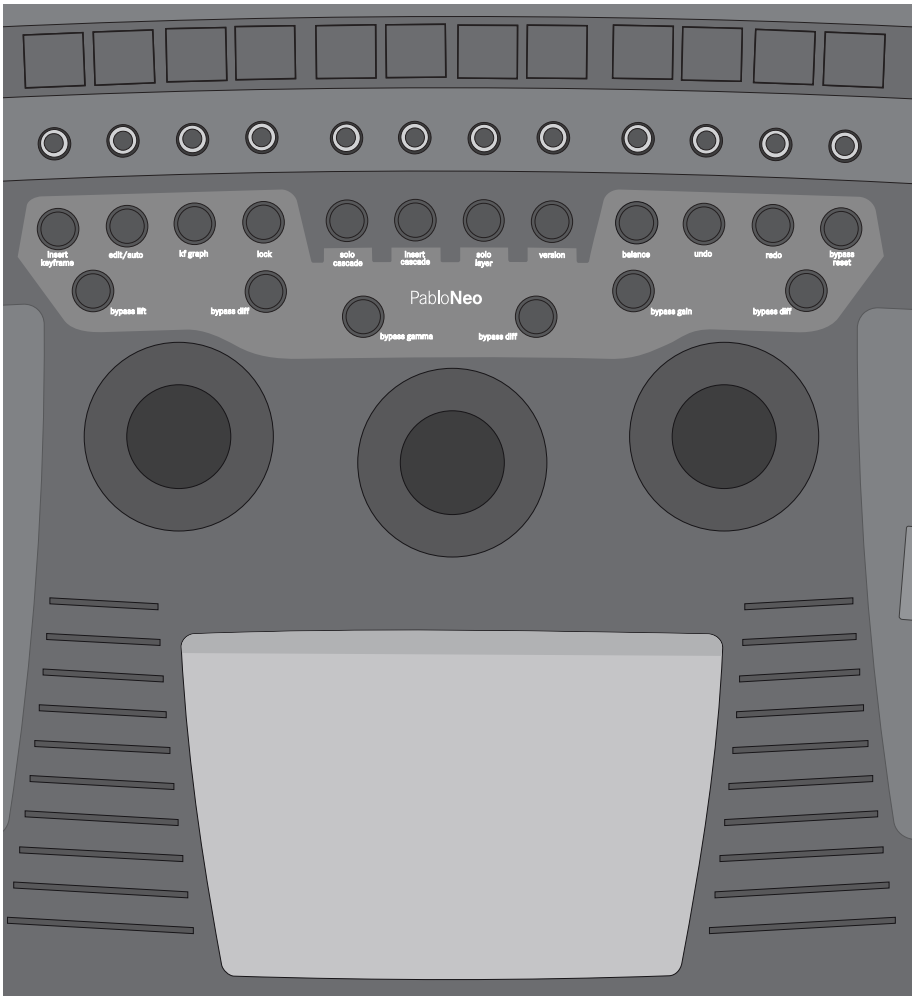
The tablet is provided to allow accurate cursor control via a pen.

Glide Pads

There are two glide pads in the secondary grading area, to the left and right of the number pad. They allow you to control the GUI cursor with your finger (similar to a laptop PC). Move your finger across the pad to move the cursor. Press to select an item. To drag, press twice and on the second press, hold down and drag. Glide pads are not as accurate as a pen and tablet: they are intended for easy access of GUI menus.

Primary Grading Area

The primary grading area is fixed over the centre of the panel. It has 12 OLEDs and rotary knobs, 18 buttons, 3 roller balls/rings, and a tablet. Functions are described throughout this section.



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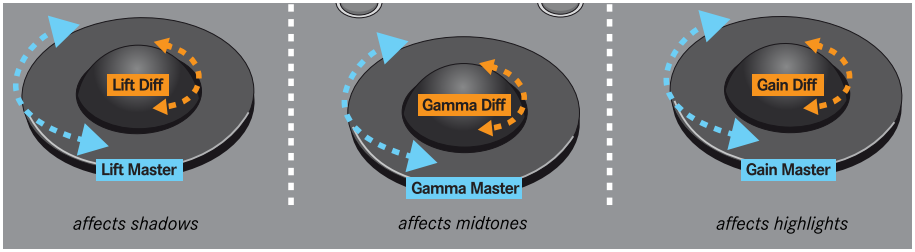
Roller Balls & Rings – MLT FX

Colour Functions



In *mlt fx – colour*, each roller ball affects colour differential, ie each colour component can be adjusted separately. Moving the left ball adjusts the image's lift (shadows); the middle ball adjusts gamma (midtones); and the right ball adjusts gain (highlights).

Each roller ball has a ring around the outside. This is the master control; rotating it allows all colour components to be adjusted together.

You can use a roller ball's associated 'bypass' buttons to bypass or reset either the master or differential value. See 'Buttons – MLT FX – Colour Bypass/Reset' in following section for more details.

Locking Lift & Gain

If you tick the *lock* box in the GUI, lift and gain can be controlled together by using the left ball and ring.

Changing Roller Ball Vectors

The corresponding ring display in the *mlt fx – colour* menu shows roller ball adjustments graphically.

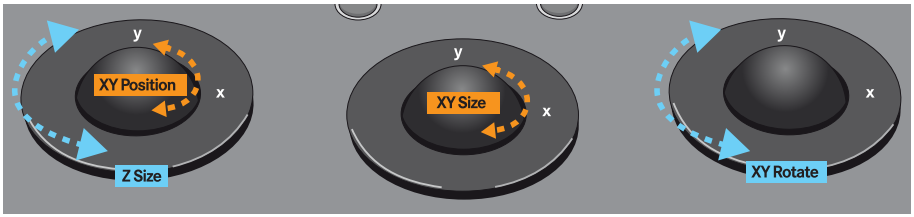
If you tick the *vectors* box in the centre of the MLT FX menu area, you can change the angle at which colours are distributed around the roller ball via the pop-up. Colour order from left to right is always green, red then blue.

With the top scroll box set to *Low/Mid/High (GRB)* you can set the angle of these colours to either *90˚*; *120˚* for an even distribution; or *VScope* so that colours correspond to a vectorscope graticule.

Alternatively, from the top scroll box, select *Custom Angle* then enter a required angle in the numeric box below.

DVE Functions

In *mlt fx – dve*, the roller balls and rings do the following:



Alternatively, if you want to remain within the *mlt fx – colour* process, you can hold down <Ctrl> to toggle DVE roller ball functions on temporarily.

Hold down the 'DVE' panel button in the secondary grading area to reset DVE parameters.

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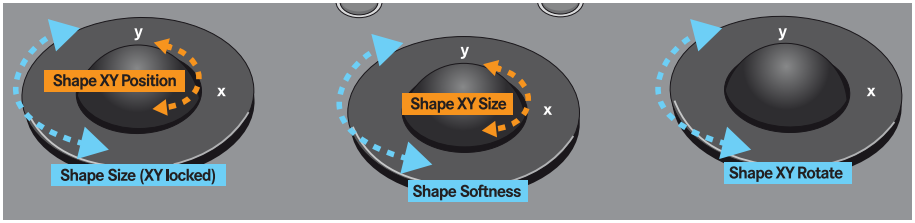
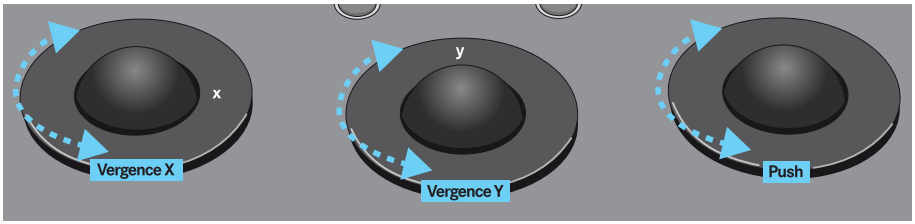
Shaped Functions

In *mlt fx – colour – selective – shaped,* or *mlt fx – graphics*, the roller balls and rings do the following:



Vergence Functions

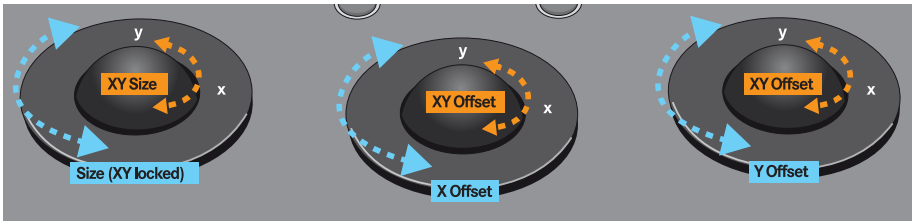
For the following functionality, you must have stereo media loaded on the timeline and *mlt fx – stereo – vergence* selected. The panel rings do the following:



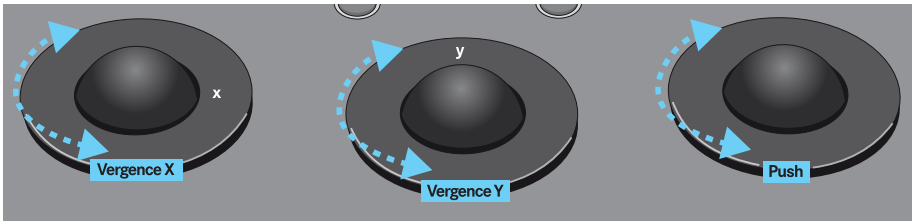
Roller Balls & Rings – Edit

Pan & Scan/3D Control Functions

With MLT FX closed, turn Pan & Scan on by pressing the **Pan + Scan** panel rotary knob on the top-right of the primary grading area to 'on'. The panel OLEDs now display applicable mono or stereo functions, depending on the current clip. Some of the panel's button functionality now changes (see 'Buttons' later in this chapter) in addition to the following roller ball functionality:



With Stereo3D media, a **3D Control** OLED/rotary knob automatically appears. Press this to 'on' which changes functionality as follows:



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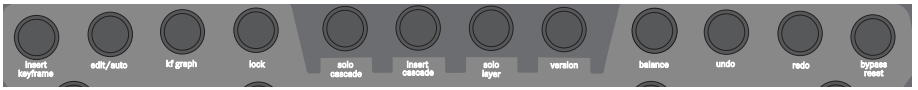
Buttons – Global Functions



These buttons are generally available (when illuminated blue) across various GUI/panel modes. Press a button once to enable it: press again to disable it. The buttons do the following (from left to right):

insert keyframe With the GUI *edit* mode on, this button will illuminate as a reminder to manually insert a keyframe when a parameter is changed. Press this button to manually insert a keyframe for all active parameters; press and hold to insert a keyframe for ALL parameters. (Note that with the GUI *auto* mode on, a new keyframe is inserted automatically when a parameter is changed).

edit/auto Toggles keyframe edit/auto mode. In 'auto' mode (ie button illuminates red), a new keyframe is automatically entered when a process parameter is changed. In 'edit' mode (ie button illuminates orange) the insert keyframe button illuminates as a reminder to manually insert a keyframe whenever a parameter is changed.

kf graph Displays a keyframe graph in the GUI.

lock Locks colour gain and lift together so that any change made to one affects the other. This applies to both master and differential controls.

solo cascade Press to view the selected cascade only.
Hold down to reset the current Cascade's colour settings.
Hold down <Ctrl> and press to rename the current cascade via the pop-up.

insert cascade Press to add a new cascade level.

solo layer Press to view the selected layer only (ie 'solo'). The OLED text turns green to indicate this. With stereo media, hold down <Ctrl> and press to display extra functionality (see 'Applying Eye Processes' later in this chapter for details).

version *an Effects function; this is not supported in MLT FX.*

balance Set white balance. Press once, select colour from the image, and press again to turn off when finished on-screen selection.

undo Press to undo the previous action (do this multiple times for multiple undo levels)

redo Press to redo the previous action (do this multiple times for multiple redo levels).

bypass/reset Press to toggle all processes on/off. Hold down to reset the current process.

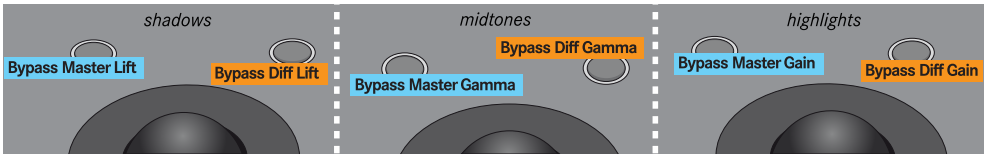
Keyframe Navigation

The first four buttons described in the previous section can all be used to control keyframes.

Hold down <Ctrl> and press the start/end segment key (|< or >|) on the right of the panel to step backwards or forwards through each keyframe.

Buttons – MLT FX

Colour Bypass/Reset



Each roller ball has two associated buttons above, as shown in the diagram. You can do the following on a button:

press bypass toggle for master parameters or differential (individual) parameter

hold down reset master parameters or differential parameter to defaults.

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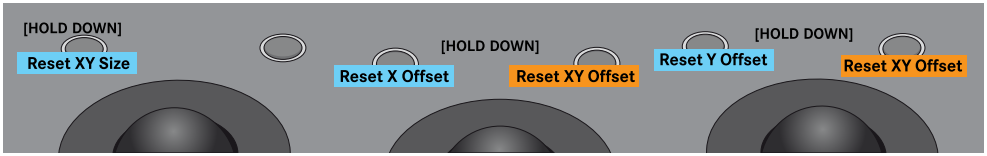
Buttons – Edit

Pan & Scan/3D Control Functions

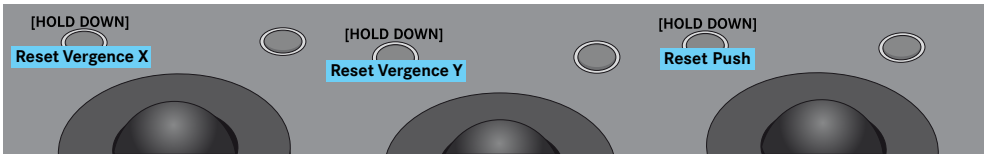


With MLT FX closed, turn Pan & Scan on by pressing the **Pan + Scan** panel rotary knob on the top-right of the primary grading area to 'on'. The panel OLEDs now display applicable mono or stereo functions, depending on the current clip. The roller ball functionality now changes (see 'Roller Balls & Rings' previously in this chapter) in addition to the panel buttons shown in these diagrams. You can do the following on a button:

hold down reset Pan & Scan size/offset.

With Stereo3D media, a **3D Control** OLED/rotary knob automatically appears. Press this to 'on' which changes button functionality as follows:

hold down reset vergence/push.



In this mode, the **bypass/reset** button on the right of the panel can also be used as follows:

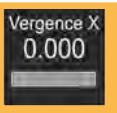
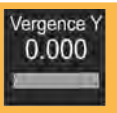
press resets Pan & Scan
hold down deletes Pan & Scan keyframes.

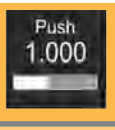
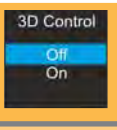
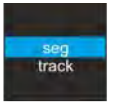
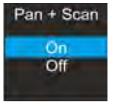
See 'Pan & Scan' in the Editing User Guide and the Stereo3D User Guide for more details of GUI functions.

OLEDs & Rotary Knobs – Edit

Pan & Scan/3D Control Functions

Edit menu: 'Pan & Scan'. Note that MLT FX must be closed. Panel functions that appear automatically with a Stereo3D clip are indicated below in an orange block. The rotary knobs and OLEDs are used as follows (from left to right on the panel):

						
turn	adjust x size	adjust y size	adjust x offset	adjust y offset	adjust x vergence	adjust y vergence
press						
<Ctrl>+ press						
hold down	reset x size	reset y size	reset x offset	reset y offset	reset x vergence	reset y vergence

						
turn	adjust push				apply Pan & Scan to current seg or track	
press				3D panel ring functions on/off		Pan & Scan panel & GUI functions on/off
<Ctrl>+ press						
hold down	reset push					

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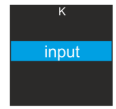
OLEDs & Rotary Knobs – MLT FX

In each of the following modes, the rotary knobs and OLEDs are used as follows (from left to right across the centre of the panel):

Colour Default & Lights

MLT FX menu: *colour – primary* (also available in other colour menus without panel functions assigned).

						
turn	adjust saturation/ hue*	adjust s-curve	adjust sharpness/ softness	select inside/ outside area	select cascade	select input cascade
press	saturation/ hue* off/on	s-curve off/on	aperture off/on	inside or outside off/ on	cascade off/ on	use key created (K) off/on
<Ctrl>+ press					**+ <Shift>** insert cascade	
hold down	reset saturation/ hue*	reset s-curve	reset aperture	delete inside or outside effect	delete current cascade	

* In default mode, the **Hue** control moves to the left of **Sat** (ie into the panel's secondary grading area) whereas in other modes it is positioned first in the primary grading area, as shown above.

turn	select track (*3D functions in next section)*		adjust density	adjust red light	adjust green light	adjust blue light
press	mute track (turns red)/ show track (*3D in next section)*		density off/ on	red light off/ on	green light off/on	blue light off/on
<Ctrl>+ press	toggle track FX/seg FX **+ <Shift>** *(3D in next section)*					
hold down	delete current track (*3D functions in next section)*		reset density	reset red light	reset green light	reset blue light

Note that a negative value increases the cast of a specific colour when adjusting 'lights', as the controls are relative to negative film.

Selecting/Enabling Eyes

In MLT FX, the 'track' OLED indicates numbered mono and stereo timeline tracks that you can toggle through, solo or delete via the rotary knob (see previous table). With mono media, the L and R at the top of the display are greyed-out.

With stereo media in MLT FX, the L and R at the top illuminates (they are greyed-out with mono media). This allows you to mute/solo an eye on the current track by holding down <Shift> then pressing the 'track' rotary knob to toggle between L , R, or L and R together (see screen shot). Alternatively, hold down <Shift> and <Ctrl> then press the 'track' rotary knob to toggle between L or R only (not L and R together).

Each *L* or *R* box (below the GUI Edit Window) and on the panel display turns pink when an eye is enabled, and the Edit Window image updates accordingly.

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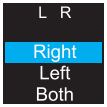
Note that both eyes are displayed in the Edit Window and on the output by default. You cannot mute both L and R together.

Applying Eye Processes



With stereo media in MLT FX, you can insert processes (eg colour) on the left eye, right eye or both eyes via the panel.

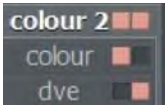
Press <Ctrl> and the **solo layer** button to switch the 'track' rotary knob to MLT FX 3D mode (press this later to return to normal track mode):

1. Choose the process or menu you require either from the panel or by selecting the process in the GUI, eg *colour*.

2. Turn the rotary knob to the required track eg Right, then push and hold it to set the process for only the right eye.

3. Perform the required process changes; notice the GUI now displays a pink box for the right eye to indicate a change has been made.

4. While still within the same process (*colour* in this example), you can now choose the left eye via the track selector knob; a second process (*colour 2*) now displays in the GUI above the first one. Perform the changes as required and if necessary create a third process for both eyes.



You can now use the rotary knob to move between processes. If more than 3 processes are created, only the first Left, Right or Both process in the stack can be selected via the panel knob; to select subsequent processes, eg *colour 2, colour 3,* select the process via the GUI.

See 'Stereo3D User Guide' for more details of panel and GUI functions.

Vergence

MLT FX menu: *stereo - vergence* (you must open this menu in the GUI and have stereo timeline media).

In this menu, panel ring functions also change: see previously in this chapter.

	conv X 0.000	conv Y 0.000	push LR	push L 100.00	push R 100.00	float LR
turn	adjust x vergence	adjust y vergence	adjust push LR	adjust push L	adjust push R	adjust float LR
press	x vergence off/on	y vergence off/on	push LR off/on	push L off/on	push R off/on	float LR off/on
<Ctrl>+ press						
hold down	reset x vergence	reset y vergence	reset push LR	reset push L	reset push R	reset float LR

		float L 0	float R 0	rotate LR	rotate L 0.000	rotate R 0.000
turn		adjust float L	adjust float R	rotate LR	rotate L	rotate R
press		float L off/on	float R off/on	rotate LR off/on	rotate L off/on	rotate R off/on
<Ctrl>+ press						
hold down		reset float L	reset float R	reset rotate LR	reset rotate L	reset rotate R

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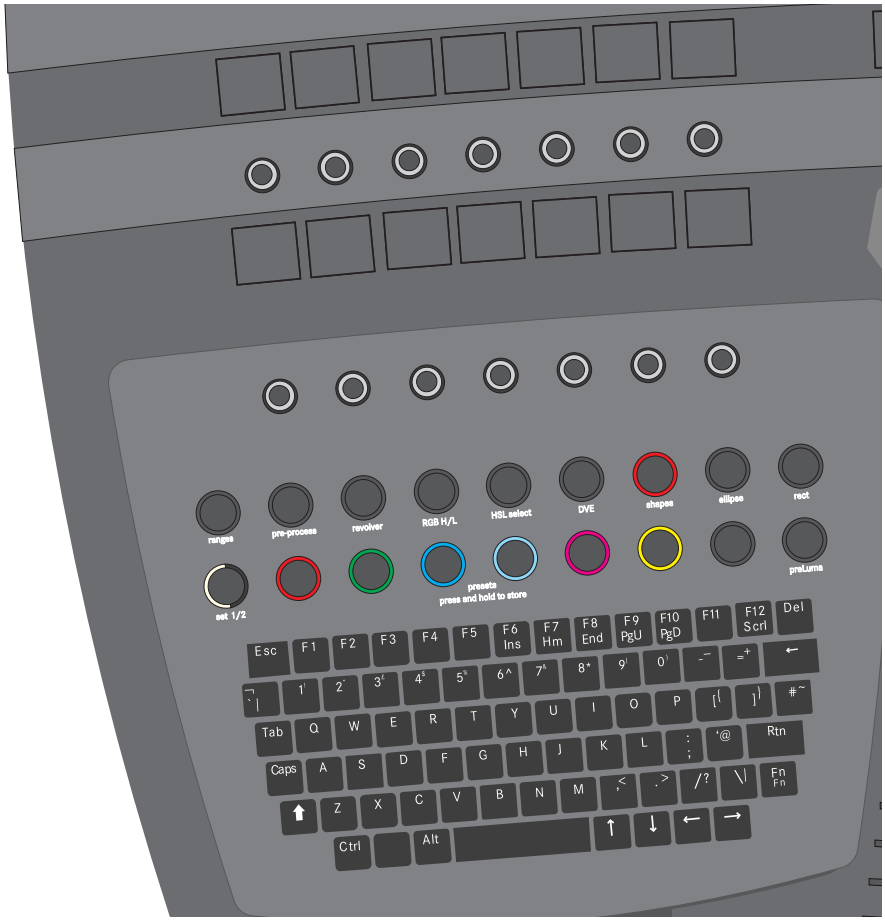
Secondary Grading Area

The secondary grading area is over the left plate of the panel (by default, although you can swap the plate to the right). It has 14 OLEDs and rotary knobs, 18 buttons and the integral keyboard. Functions are described throughout this section.



Buttons

These buttons are generally available (when illuminated blue) across various GUI/panel modes. Press a button once to enable it: press again to disable it. The buttons do the following (from top-left to bottom-right):

TOP ROW

ranges/ fettle	displays **Ranges** mode. Press to toggle between GUI fettle graphs (with no panel functions) and ranges graphs (has panel rotary knob functions).
preprocess	displays **Preprocess** panel mode (ie the pre-process functions below the base cascade).
revolver	displays **Revolver** panel mode. In this mode, bank 1 (see **presets** button) stores the input hue; bank 2 stores both the input and the output hue.
RGB H/L	displays **RGB H/L** (high/low) panel mode.
HSL Select	displays **HSL Select** panel mode.
DVE	displays **DVE** panel mode.
shapes	displays **Shapes** panel mode.
ellipse	creates an ellipse.
rect	creates a rectangle.

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BOTTOM ROW

set 1/2 toggles which preset bank is active (1 or 2).

presets (6 buttons) the 6 different coloured 'preset' buttons allow colour and shape settings to be saved then re-used. Each button can be used in bank 1 and bank 2, resulting in 12 available presets. Toggle each bank via the **set 1/2** button.

See 'Saving & Using Presets' later in this chapter for more details.

preLuma This switches the sequence in which the colour controls are applied to the image and corresponds with the *pre diff* box in MLT FX.

When **preLuma** is off, the lift, gamma and gain values are applied before hue, saturation, Revolver and Fettle

When **preLuma** is on, hue, saturation, Revolver and Fettle are applied before the lift, gamma and gain values.

PreLuma can be used to create sepia or duotone effects. Desaturation of an image in standard mode (ie with preLuma off) prevents a colour cast being added using the lift, gamma and gain controls. With preLuma on, the image can be desaturated before lift, gamma and gain controls are used to add a colour cast.

OLEDs & Rotary Knobs – MLT FX

In each of the following modes, the rotary knobs and OLEDs are used as follows (from left to right across the left side of the panel):

Ranges/Fettle

MLT FX menu: *colour – fettle*
Panel button: **ranges** (top-left on panel; press to toggle fettle/ranges graphs)

				Sat Shadow 100.0	Sat Mid 108.4	Sat High 100.0	Hue 29.3
turn				adjust range shadow saturation	adjust range midtone saturation	adjust range highlight saturation	adjust range hue
press				range shadow saturation off/on	range midtone saturation off/on	range highlight saturation off/on	range hue off/on
<Ctrl>+ press							
hold down				reset range shadow saturation	reset range midtone saturation	reset range highlight saturation	reset range hue

	Default Ranges 1 Ranges 2 Ranges 3	Graph hiCon off shadow midtone highlight	Shadow 1 0	Shadow 4 285	Highlight 1 738	Highlight 4 1023	master slim range shadow midtone highlight
turn	select range (max 12 custom)	enable/ select ranges graph type	adjust range shadow 1 vector	adjust range shadow 4 vector	adjust range highlight 1 vector	adjust range highlight 4 vector	select roller ball range mode
press	range off/on	graph off/on					current range mode off/on
<Ctrl>+ press	rename ra. **hold down:** delete ra. **turn:** reorder ra..						
hold down	save current range	reset current graph	reset range shadow 1	reset range shadow 4	reset range highlight 1	reset range highlight 4	reset range grade

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Preprocess

MLT FX menu: *colour – preprocess*
Panel button: **preprocess** (second top-left on panel)

turn				adjust shadow saturation	adjust midtone saturation	adjust highlight saturation	
press	bypass 3D LUT	convert on/off*		shadow sat. off/on	midtone sat. off/on	highlight sat. off/on	
<Ctrl>+ press							
hold down				reset shadow saturation	reset midtone saturation	reset highlight saturation	

turn	select & show 3D LUT in GUI	adjust minimum density*	adjust maximum density*				
press	display 3D LUT list	D Min off/on*	D Max off/on*				
<Ctrl>+ press							
hold down		reset D Min*	reset D Max*				

*__DMin/DMax__ and __Convert__ options above only appear if the clip has log data. Selecting __Convert__ converts log-based material to a linear image. Although rarely used, the __DMin/DMax__ values can be specified (see 'Applying Colour Cubes' in chapter 1 for more details).

RGB Min/Max

You can select **RGB Min/Max** mode if the clip has log data. The lower group of OLEDs now change as shown below. Select **Convert** to convert log-based material to a linear image.

Although rarely used, you can specify ranges for individual R, G and B density (see 'Applying Colour Cubes' in chapter 1 for more details).

turn	select 3D LUT (RGB Min/Max)	adjust red minimum density	adjust red maximum density	adjust green minimum density	adjust green maximum density	adjust blue minimum density	adjust blue maximum density
press	display 3D LUT list	D Min Red off/on	D Max Red off/on	D Min Green off/on	D Max Green off/on	D Min Blue off/on	D Max Blue off/on
<Ctrl>+ press							
hold down		reset Red D Min	reset Red D Max	reset Green D Min	reset Green D Max	reset Blue D Min	reset Blue D Max

Scrolling through the list automatically previews the cube effect on the current segment in the Edit Window. When the segment is rendered, the cube is 'burnt in'.

Use the rotary knob on the top-right of the panel to select an output LUT then toggle the live LUT on/off via the panel's 'luts on/off' button. See button and rotary knob descriptions in the 'Transport/ Transfer Area' section for details.

See 'Applying Colour Cubes' in chapter 1 for how to create, modify and apply a cube. See Appendix for details of modifying FilmLook parameters.

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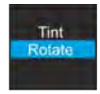
Revolver

MLT FX menu: *colour – revolver*
Panel button: **revolver**

turn	invert or normal selection	adjust input hue	adjust hue width	adjust hue soft			
press	invert off/on	input hue off/on	hue width off/on	hue soft off/on			
<Ctrl>+ press							
hold down		reset input and output hue	reset hue width	reset hue soft			

							
turn	select barrel	adjust output hue	adjust output saturation	adjust output luminance	select hue range		
press	current barrel off/on	output hue off/on	output saturation off/on	output luminance off/on			
<Ctrl>+ press							
hold down	reset current barrel	reset output hue	reset output saturation	reset output luminance			

RGB H/L

MLT FX menu: *colour – primary*
Panel button: **RGB H/L**

		Master Lift 10	Master Gam 1.3	Master Gain 122	Red Gain 122	Green Gain 117	Blue Gain 123
turn		adjust RGB master lift	adjust RGB master gamma	adjust RGB master gain	adjust red gain	adjust green gain	adjust blue gain
press		RGB master lift off/on	RGB master gamma off/on	RGB master gain off/on	red gain off/on	green gain off/on	blue gain off/on
<Ctrl>+ press							
hold down		reset RGB master lift	reset RGB master gamma	reset RGB master gain	reset red gain	reset green gain	reset blue gain

		Red Gam 1.3	Green Gam 1.0	Blue Gam 1.1	Red Lift -19	Green Lift 10	Blue Lift -8
turn		adjust red gamma	adjust green gamma	adjust blue gamma	adjust red lift	adjust green lift	adjust blue lift
press		red gamma off/on	green gamma off/on	blue gamma off/on	red lift off/on	green lift off/on	blue lift off/on
<Ctrl>+ press							
hold down		reset red gamma	reset green gamma	reset blue gamma	reset red lift	reset green lift	reset blue lift

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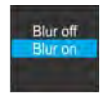
HSL Select

MLT FX menu: *colour – selective – quick key – hsl*
Panel button: **HSL select**

With **Softness** selected via the top-left rotary knob, you can modify hue, saturation and luminance key parameters together:

							
turn	select softness:	adjust global softness		select blur off/blur on	adjust key blur	grow/shrink key	adjust key softness
press		global softness off/on			key blur off/on	key grow off/on	key softness off/on
<Ctrl>+ press							
hold down		reset global softness			reset key blur	reset key grow	reset key softness

turn	select key mode	adjust hue centre (range)	adjust hue width	adjust saturation low	adjust saturation high	adjust luminance low	adjust luminance high
press	invert selection	hue centre off/on	hue width off/on	saturation low off/on	saturation high off/on	luminance low off/on	luminance high off/on
<Ctrl>+ press							
hold down		reset hue centre	reset hue width	reset saturation low	reset saturation high	reset luminance low	reset luminance high

With **Ind Soft** selected via the top-left rotary knob, you can modify hue, saturation and luminance key parameters independently:

turn	select individual softness:	adjust hue softness low	adjust hue softness high	adjust sat. softness low	adjust sat. softness high	adjust lum. softness low	adjust lum. softness high
press		hue softness low off/on	hue softness high off/on	sat. softness low off/on	sat. softness high off/on	lum. softness low off/on	lum. softness high off/on
<Ctrl>+ press							
hold down		reset hue softness low	reset hue softness high	reset sat. softness low	reset sat. softness high	reset lum. softness low	reset lum. softness high

turn	select key mode	adjust hue range low	adjust hue range high	adjust saturation range low	adjust saturation range high	adjust luminance range low	adjust luminance range high
press	invert selection	hue range low off/on	hue range high off/on	saturation range low off/on	saturation range high off/on	luminance range low off/on	luminance range high off/on
<Ctrl>+ press							
hold down		reset hue range low	reset hue range high	reset saturation range low	reset saturation range high	reset luminance range low	reset luminance range high

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DVE

MLT FX menu: *colour – primary; dve*
Panel button: **DVE**

turn		adjust x position	adjust y position	adjust x size	adjust y size	adjust xy size	adjust rotation
press	DVE off/on	original x position/ current x position	original y position/ current y position	original x size/current x size	original y size/ current y size	original xy size/current xy size	original rotation/ current rotation
<Ctrl>+ press							
hold down	reset DVE	reset x position	reset y position	reset x size	reset y size	reset xy size	reset rotation

Shapes

MLT FX menu: *colour – selective – shaped;* *graphics*
Panel button: **shapes***

turn	select shape (or multiple shapes)	adjust shape x position	adjust shape y position	adjust shape xy size	adjust square or rect. width/ ellipse x radius	adjust rect. height/ellipse y radius	adjust shape softness
press	all shapes off/on	original shape x pos./current shape x pos.	original shape y pos./current shape y pos.	original shape xy size/current shape xy size	original shape x value/ current x value	original shape y value/ current y value	original shape softness/ current softness
<Ctrl>+ press	rename shape						
hold down	delete current shape	reset shape to original x position	reset shape to original y position	reset shape to original xy size	reset shape to original x value	reset shape to original y value	reset shape to original softness

turn	select key mode	select shape interaction (with multiple shapes)	adjust shape opacity	adjust global softness	adjust shape grow	adjust shape angle	adjust opacity (
press		invert shape interaction (with multiple shapes)	global invert	original/ current shape softness	original/ current shape grow	original/ current shape angle	original/ current opacity
<Ctrl>+ press							
hold down			reset shape to original opacity	reset shape to original softness	reset shape grow	reset shape to original angle	reset to original opacity

* In any mode, you can press the **ellipse** or **rect** (rectangle) buttons on the panel to create one of these shape types: this automatically opens the GUI and panel shape functions if not already displayed.

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Saving & Using Presets

From the panel, you can store Revolver, HSL Select and Shapes settings (without keyframes) plus fettle/ranges graphs and cascades, then re-use them later as required. Preset buttons are located above the keyboard and include the **set 1/2** button and the 6 different 'available preset' coloured buttons on the right. These 6 buttons provide 12 presets—by toggling between 2 'banks'—for each applicable panel mode (eg Revolver).

Press the **set 1/2** button to toggle between the first or second bank of 6. This button has split illumination, so when bank 1 is active, the left side of this button illuminates and the buttons on the right represent presets 1, 2, 3, 4, 5, 6. Pressing **set 1/2** again illuminates the right side of this button and activates bank 2. The buttons on the right now represent presets 7, 8, 9, 10, 11, 12.

hold down on any 1 - 12 preset button overwrites any existing preset and stores the current mode's setting/item in this preset.

press on any 1 - 12 preset button recalls the preset for the current mode.

Unused empty presets usually illuminate blue, unless indicated otherwise throughout this section. Where there are default presets that appear in the GUI (eg in Revolver or HSL Select) these are displayed in bank 1, eg red, green, blue, cyan, magenta, yellow. Each default can be overwritten by holding down its panel button, then the GUI and panel button display the new colour.

Revolver & HSL Select

In Revolver or HSL Select mode, the two banks store different elements:

bank 1 stores the input hue only, which is indicated by the button illumination.

bank 2 stores both the input and the output hue. When Revolver and HSL colours are stored in bank 2, the button illumination splits and shows the input hue on the left and the output hue on the right.

Areas of the current image that match the preset hue are selected and, if the preset is from bank 2, are replaced with the output hue. Unused presets in bank 2 are illuminated in red for Revolver and in pastel colours for HSL Select: pink, pale green, pale blue, pale cyan, pale magenta, pale yellow.

Shapes

In Shapes mode, the preset buttons store a single shape. Holding down <Ctrl> then pressing a preset button recalls that saved shape and displays it in the GUI.

Fettle/Ranges Graphs

Press the top-left button on the panel to toggle between GUI fettle graphs (with no panel functions) and ranges graphs (has panel rotary knob functions).

In 'fettle' mode, each preset stores one graph, not multiple graphs.

Unused presets illuminate white; used presets illuminate blue.

Cascades

With no panel mode selected, the presets can be used to save Cascade levels. Add a new Cascade, eg '*cascade 3'* and perform the required colour correction, then press and hold the corresponding preset button (in this example you should press '3' – the third preset button from the left to match Cascade '3'): this saves the Cascade level. You can now move to a new segment and recall Cascade 3 by pressing on the preset '3' button.

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Transport/Transfer Area

The transport/transfer area is over the right plate of the panel (by default, although you can swap the plate to the left). It has 14 OLEDs and 7 rotary knobs, 18 buttons, clip navigation/transfer functions including a jog wheel, and an integral number pad. Functions are described throughout this section.

Buttons

These buttons are generally available (when illuminated blue) across various GUI/panel modes. Press a button once to enable it: press again to disable it. The buttons do the following (from top-left to bottom-right):

TOP ROW

stillstore	opens Stillstore panel mode/functions. Hold down to delete the current Stillstore.
window	zooms the current timeline segment to fit the width of the timeline window. This allows accurate parameter adjustment (eg keyframes) or transport control.
render	renders any unrendered timeline segments. This button's illumination corresponds to the colour of the GUI 'render' box on the right of the timeline: orange indicates unrendered media; purple indicates that the media is currently being rendered; white/grey indicates that no render is necessary. Hold down to toggle the <F1> *Auto Render* box on/off in the *UI* menu.
lock	toggles the GUI reel display lock on/off so that the Storyboard display is locked with the timeline during navigation. The button illuminates green when locked and red when unlocked. *Note that this button was previously used in the Effects Stillstore to toggle the clip on the main output; this is not available in the MLT FX Stillstore.*
active group	activates/deactivates the group set-up functions.
luts on/off	toggles live output LUT (lookup table) on and off. The default LUT is 'FilmLook'.

BOTTOM ROW

storyboard	opens Storyboard panel mode/functions.
bookmarks	*an Effects function; this is not supported in MLT FX.*
show stillstore	toggles the Stillstore GUI display on/off
show storyboard	toggles the Storyboard GUI display on/off.

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group create allows you to create a 'group' of clips with defined attributes. Press this button, then select a group type, and add/remove clip segments as required.

add adds a segment to the current clip group. Hold down to enter 'multiple add' mode, which allows you to add multiple clips to a group.

remove removes a segment from the current clip group. Hold down to enter 'multiple remove' mode, which allows you to remove multiple clips from a group.

Grade hold down <Shift> and press this button to display the MLT FX *colour* menu.

Edit press this to display the Edit application (with MLT FX closed).

Number Pad Functions

The number pad can be used for general numeric entry and also within Storyboard or Stillstore mode (set by pressing either the **storyboard** or **stillstore** button).

<Try> hold down to preview the selected Storyboard/Stillstore frame's current process parameters (eg colour). You can hold down <Show> then press <Try> to toggle between a preview grade and the active Storyboard/Stillstore frame.

<Use> copies the selected Storyboard/Stillstore frame's current process parameters (eg colour). Hold down <Ctrl> to apply all process parameters (eg colour, dve, text), regardless of the current process.

<Del> deletes the current tile.

<Ins> inserts a new tile before the current position.

<Repl> replaces the current tile with the current process settings.

<Add>	saves the current process settings into a new tile (ie next available)
<Goto>	navigates to the timeline segment number. In Storyboard mode, this also moves the timeline to the highlighted segment number.
<- ->	offsets Storyboard one segment to the left along the timeline.
<++>	offsets Storyboard one segment to the right along the timeline.
<Show>	displays the current Storyboard/Stillstore frame on the main output (for use with wipes). You can hold down <Show> then press <Try> to toggle between a preview grade and the active Storyboard/Stillstore frame.
<↵>	(Enter): triggers action on Storyboard/Stillstore number.
<← ↑ ↓ →>	Storyboard/Stillstore tile navigation. In Stillstore mode, a tile can be selected either by navigating using the arrow keys, or by entering the tile number. For example: press <5><3> < ↵ > to make tile 53 active. press <5><3> <Try> to preview tile 53's settings on the current segment.

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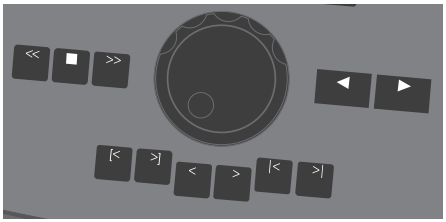
Transport Functions



The jog wheel and the associated keys allow you to move along the timeline.

Jog Wheel	rotate clockwise to move forwards along the timeline edit, or anticlockwise to move backwards. The outer wheel shuttles; the inner wheel jogs.
<< ■ >>	fast rewind; stop; fast forward
◀ ▶	reverse play; play
[< >]	jump to start; jump to end.
< >	step back one frame; step forward one frame
|< >|	first frame of previous clip segment; first frame of next clip segment.
<Ctrl> + |< >|	step backwards through keyframes; step forwards through keyframes.

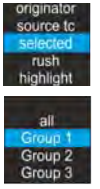
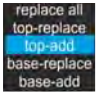
See 'Storyboard' and 'Stillstore' in 'OLEDs & Rotary Knobs' section, and chapter 1 for GUI functions.

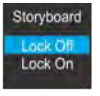
OLEDs & Rotary Knobs – MLT FX

These are used as follows (from left to right across the right side of the panel):

Storyboard, Stillstore, Group, LUT

MLT FX menu: *any*
Panel button: to use Storyboard: **storyboard** and **show storyboard***
to use Stillstore: **stillstore** and **show stillstore***
to display/set-up groups: **active group** and **group create***
to toggle output LUT: **luts on/off***

							
turn	adjust wipe level	adjust wipe angle	select storyboard reel	select group type/select existing group*	select group grade cascade & action*	*(OLED only: live LUT complete name)*	select live output LUT
press	wipe off/on	toggle vertical or horizontal wipe	open storyboard reel	create new group*	apply group grade*		
<Ctrl>+ press	**<Ctrl> + turn** scale story reel **<Shift> + turn** scale story tile	**<Ctrl> + turn** scale stillst. reel **<Shift> + turn** scale stillst.tile		rename group*			
hold down	reset to vertical wipe	reset to vertical wipe	delete current reel (except 'Main')	delete current group*			refresh LUT list

							
OLED only	*ref/wipe frame: OLED outlined white if wipe on*	*current timeline frame*	*storybd. lock off/on** (***lock*** *button)*	*current group complete name*			

* Storyboard, Stillstore, Group and LUTs are described in the next sections.

The **lock button was previously used in the Effects Stillstore to toggle the clip on the main output; this is not available in the MLT FX Stillstore.

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Storyboard

To use the Storyboard, press the **storyboard** button (for panel functions) and the **show storyboard** button (for GUI display).

For general details of this function, see chapter 1.

Lock with Timeline

If required, press the **lock** button to synchronise the 'Main' storyboard reel (you cannot lock a different reel) with the timeline, so that during navigation they move together. Lock status is indicated in the OLED above the button. With **lock on**, an offset can be set between clips so that a process can be applied at regular intervals.

Offset the Lock

To offset the lock:

1. Navigate to the required starting segment, using the <← ↑ ↓ →> keys.
2. Press the **lock** button to **on**.
3. Use the <++> and <- -> keys to set the offset; each keypress moves the offset up or down by one segment.

The offset number is displayed in the bottom-right corner of the 'lock' OLED and is indicated in the GUI by the magenta cursor (see following section).

GUI Cursors

The Neo panel provides two types of cursor that appear in the GUI. The green corner cursor on the top-left and bottom-right of a tile indicates the current timeline position and has focus when **lock** is **off**. In this mode, the Storyboard does not scroll if a timeline segment near the end of the sequence is selected: to do this, press <Goto> on the number pad (without entering a number).

The magenta corner cursor on the bottom-left and top-right of a tile indicates the timeline lock position and has focus when **lock** is **on**.

Edit a Storyboard

To add a clip segment using the panel:

1 Press the **storyboard** button.

2 To position the clip within the Storyboard, navigate to the required tile using the <← ↑ ↓ →> keys.

3 Press one of the following keys:

<Repl>	replaces the existing clip in the tile at the selected position.
<Add>	adds the new clip in a tile at the end of the Storyboard reel.
<Ins>	inserts the new clip in a tile before the current position.

To remove a clip segment using the panel:

1 Navigate to the unwanted clip using the <← ↑ ↓ →> keys.

2 Press <Del>.

Previewing & Using a Grade

When a Storyboard frame is selected using either the number pad, the <← ↑ ↓ →> keys or the jog wheel, you can do the following:

<Try>	previews the selected frame's current process parameters (eg colour). You can use this with <Show> (see below).
<Use>	copies the selected frame's current process parameters (eg colour). Hold down <Ctrl> to apply all process parameters (eg colour, dve, text), regardless of the current process.
<Show>	displays the current frame on the main output (for use with wipes). You can hold down <Show> then press <Try> to toggle between a preview grade and the active Stillstore/ Storyboard frame.

Note that a Stillstore or Storyboard tile containing a Stereo3D clip only displays the left eye, but both left and right eye processes are stored and subsequently applied; see the Stereo3D User Guide for more details.

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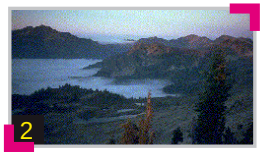
If the active wipe is 2% or less (ie minimal) and process parameters are changed, the <Show> key turns off and the white OLED outline disappears. <Show> can be assigned to the optional footpedal with the <Ctrl>+<Shift>+<s> modifier.

Stillstore

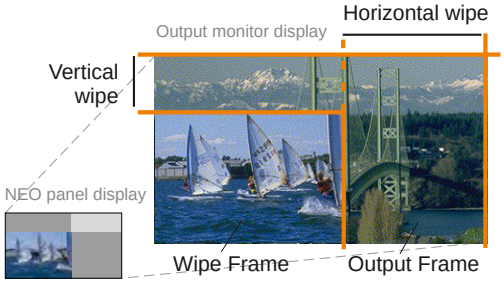
To use the Stillstore, press the **stillstore** button (for panel functions) and the **show stillstore** button (for GUI display).

For general details of this function, see chapter 1.

GUI Cursor



Note that **lock** should be **off** when using the Stillstore in MLT FX. The magenta corner cursor on the bottom-left and top-right of a tile indicates the wipe frame (ie the current Stillstore frame). This can be previewed directly with the current timeline clip then the wipe frame's process parameters applied using the panel functions. Use the <← ↑ ↓ →> keys to navigate through the Stillstore.



Use the wipe rotary knobs (see table previously in this section) to control the amount and angle of wipe.

Storing a New Still

To store a frame and its process parameters in the Stillstore:

1 Press the **stillstore** button.

2 To position the clip within the Stillstore, navigate to the required tile using the <← ↑ ↓ →> keys.

3 Press one of the following keys:

<Repl>	replaces the contents of the selected Stillstore tile with the new frame and process parameters.
<Add>	adds a new tile at the end of the Stillstore then stores the current frame and process parameters in it.
<Ins>	inserts a new Stillstore tile before the current position then stores the current frame and process parameters in it.

Previewing & Using a Wipe

Use these functions to preview/apply the wipe frame parameters:

<Try>	previews the wipe's current process parameters (eg colour) on the output image. You can use this with <Show> (see below).
<Use>	copies the wipe's current process parameters (eg colour) to the output image. Hold down <Ctrl> to apply all process parameters (eg colour, dve, text), regardless of the current process.
<Show>	displays the wipe on the main output. You can hold down <Show> then press <Try> to toggle between a preview grade and the active Stillstore/Storyboard frame. The wipe has focus, so bypassing/resetting the wipe recalls the wipe on the output display. To move focus to the current timeline clip, press <Show> again.

Note that a Stillstore or Storyboard tile containing a Stereo3D clip only displays the left eye, but both left and right eye processes are stored and subsequently applied; see the Stereo3D User Guide for more details.

If the active wipe is 2% or less (ie minimal) and process parameters are changed, the <Show> key turns off and the white OLED outline disappears. <Show> can be assigned to the optional footpedal with the <Ctrl>+<Shift>+<s> modifier.

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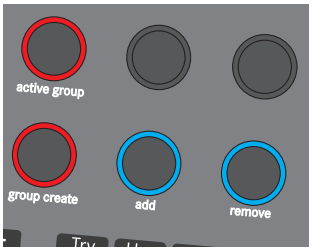
Creating & Modifying a Group



The panel provides timeline clip 'group' rotary knobs and buttons that allow you to create groups of clip segments and then apply colour changes to any group. These functions appear on the panel in Storyboard/Stillstore mode when you press the **active group** or **group create** buttons, or by ticking the *group* box in the GUI.

Create a New Clip Group

To create a group using the panel:

1 Press the **group create** button. The fourth rotary knob from the left now displays the following, allowing you to set the group type:

originator	includes all clip segments with the same originator as the selected segment
source tc	includes all clip segments that share the source timecode of the selected segment
selected	allows you to manually select segments
rush	includes all clip segments from the same source rush
highlight	this option only appears if the *Highlight changes* box has been ticked in the <F1> Configuration Window: it includes all the clips of the current 'highlight' colour, eg red.

2 Turn this rotary knob to the required selection eg **rush,** then press it to create the new group, indicated on the timeline by cyan highlights on group clips (you may need to now manually select clips if **selected** is chosen).

3 Rename the group if required by holding down <Ctrl> plus the list rotary knob. Use the soft-keyboard to enter a name.

4 Add or remove clips to the group via the **add/remove** buttons as follows:

Press **add** or **remove** once to add/remove the selected clip segment.

Hold down **add** or **remove** to enable multiple selection: you can now select clip segments by using the transport functions then pressing ↵ (Enter) to add/remove each segment.

Alternatively, you can use the keyboard to enable multiple selection. Hold down <Shift> to select segments next to each other, or <Ctrl> to select segments anywhere on the timeline. Then press **add** or **remove** to add/remove all these segments to the group.

Modify a Group

To modify an existing group using the panel:

1 Press the **active group** button. The fourth rotary knob from the left now displays a list of existing groups highlighted cyan, eg **all** (default status), **Group 1**, **Group 2** etc, unless renamed.

2 Turn this rotary knob to the required group, then do one of the following:

to modify the group's clips...	use the **add** and/or **remove** buttons as described previously.
to rename the group...	hold down <Ctrl> with the list rotary knob. Use the soft-keyboard to enter a name.
to delete the group...	press the list rotary knob. The selected group is now deleted.

Apply a Group Grade

The following transfer/target options only appear on the panel if a group segment has colour process parameters. You can then select an option to specify the application method used for the colour changes on a clip group:

1 Press the **active group** button, then turn the list rotary knob to the required group (or create a group first as described previously).

2 On the timeline, select a group segment and perform the grade.

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3 Select which target cascades will be affected by turning the rotary knob on the right of the list to the required option: 'base' options affect the base cascade; 'top' options affect the top cascade; 'all' options affect all cascades. Choose how the grade is applied using various 'replace', 'add', 'insert' or 'trim' options.

Possible combinations are:

Replace all; top replace; base replace; replace by name; replace all minus base; replace pre-process
applies the grade from the current clip (ie all cascades, HSL, shapes etc) to the other segments in the group in the following ways: to all cascades (with/without base); the top or base cascade only; the cascade which matches the source name; or applies only the pre-process LUT.

Top add; base add
applies the grade from the current cascade only and adds it as a top cascade or under the base cascade on all the other segments in the group.

Insert
inserts the graded current cascade at the same cascade level to all clips in the group (this must be at least above the base level).

Top trim; base trim; trim by name
applies only the change in colour process values to all the segments in the group. 'Top' or 'base' trims the top or base cascade of the destination segment; 'by name' trims the cascade on the destination segment which has the same name as the source cascade.

Note that trim options are available only when the source segment has colour process parameters for primary, defocus, lights or ranges functions. If the destination segment has keyframes, only the change in values in the source segment at the current position is applied to these destination keyframes: source keyframes are not copied.

4 Press the rotary knob to apply the selected group grade.

Previewing & Applying LUTs

Apply a Pre-process LUT

In **preprocess** panel mode, you can turn the 'list' rotary knob on the left side of the panel to preview each LUT effect on the current clip in the GUI Edit Window, then when the clip is rendered the selection is 'burnt in'.

See 'Preprocess' rotary knob descriptions in the 'Secondary Grading Area' section for details.

Select an Output LUT

On the right of the panel, press the **luts on/off** button to toggle the current live LUT on or off (this corresponds to the GUI *lut* tick box). This is output to the monitor or tape and does not physically affect the system held media, or the GUI Edit Window image.

Turn the top-right rotary knob to select an output LUT from the list in the OLED. Hold down the knob to refresh the list and include new LUTs.

Longer names appear in the OLED with '~' inbetween the first and last characters; the OLED on the left of the list displays the complete name of the selection.

When creating a cube to be used for FilmLook or I/O – Export, you can avoid confusion by disabling FilmLook on output. Do this by deselecting *lut* on the Application Bar (this toggles the live LUT).

See 'Applying Colour Cubes' in chapter 1 for how to create, modify and apply a cube. See Appendix for details of modifying FilmLook parameters.

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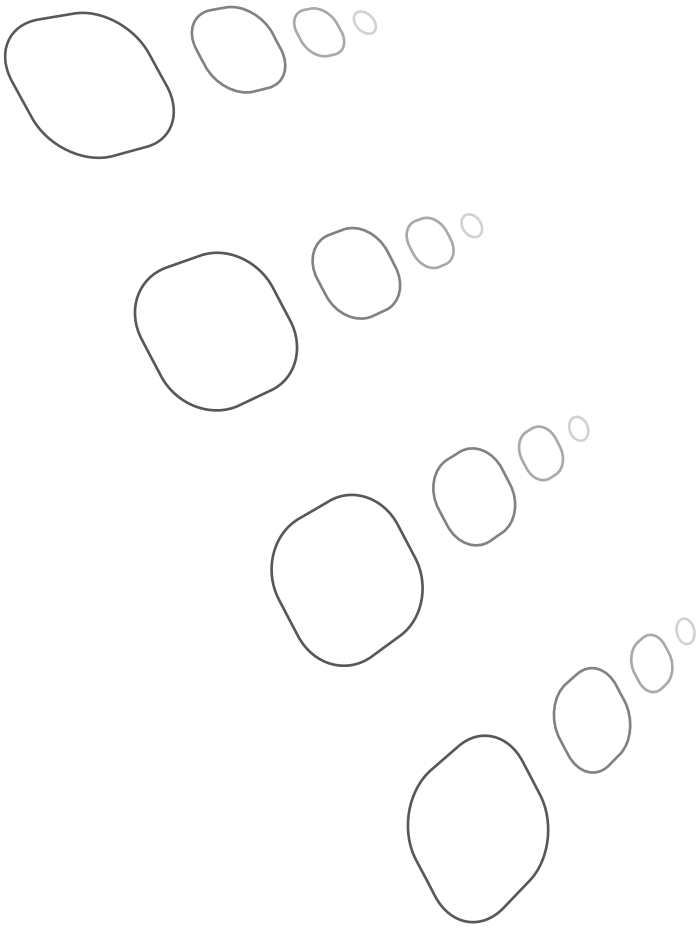


A

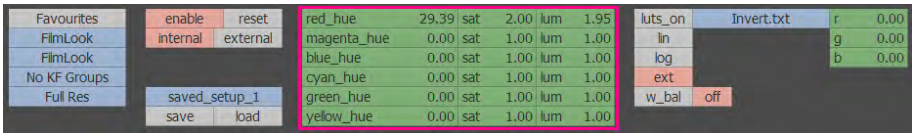
Appendix

The FilmLook system affects the way the image is displayed on SD and HD monitoring devices and provides a generally accurate emulation of the final display method (eg film).

FilmLook System

Overview

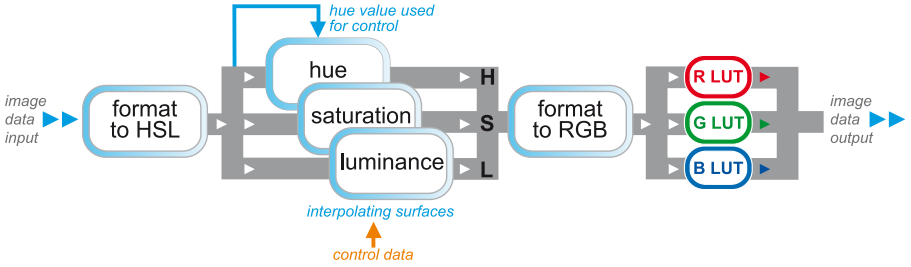
FilmLook is controlled from within the Utility application and provides a set of controls to allow you to match the graduation and colour of material in real time. The final viewing method can be video monitor, video projector, or film. The viewing method should be considered in order to avoid problems on a display device that has different properties to the display used during preparation.



You can correct hue, saturation, brightness and gamma so that the system display provides a generally accurate emulation of the final display method. There are some limitations to the correction capability; eg fully saturated colours in one colour space may not be reproduced accurately in another.

Note that FilmLook does not affect saved media data: the colour effect appears live on the SD and HD monitor outputs but not in the GUI Edit Window.

Output LUT Circuitry



The HD and SD monitor output hardware of Quantel platforms contain programmable hardware to allow the 'look' of the output to be controlled. As part of this process, the image data is passed through RGB look up tables (LUTs)

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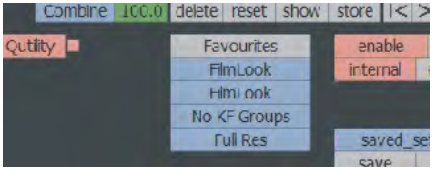
to modify the overall gradation from input to output. In the previous diagram these LUTs are represented by the boxes labelled R, G and B.

Utility Application – Opening FilmLook

To access FilmLook controls, press the *Utility* tab on the Application Bar.



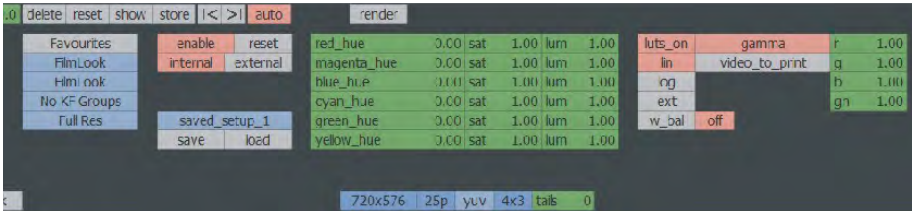
Select *FilmLook* from the scroll box below *Favourites* on the left of the menu area. Another scroll box appears directly below; select *FilmLook* again (as in the screen shot).

Toggling the Output LUT

At any time during modification, you can press the *enable* box in Utility to toggle the live LUT on the output; alternatively press the *lut* tick box on the Application Bar.

Modifying the Live LUT

Press the *internal* box if you want to modify the current output LUT. Individual hue, saturation and luminance levels can be modified on the red, magenta, blue, cyan, green and yellow channels of the output video. The red, green and blue gamma can also be changed. Adjust each value using the corresponding bank of green numeric boxes.

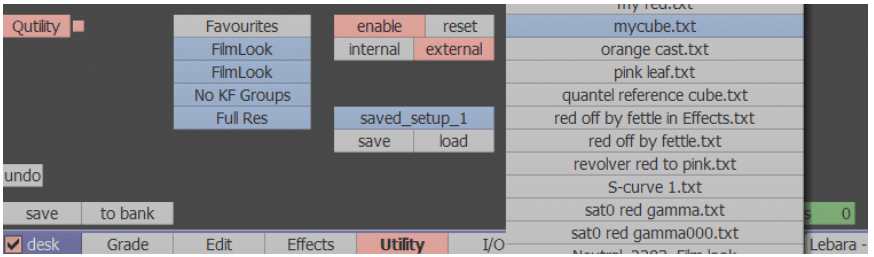


When modifying values, visualise the primary and secondary hues as being equally spaced around a circle – so red, yellow, green, cyan, blue and magenta

are spaced at 60 degree intervals. Changing a hue value therefore shifts the hue around the circle to another colour, and this colour's saturation and luminance can be modified from 0.5 to 1.5.

The hue, saturation and luminance controls in each colour operate only with minimal interaction with nearby colours and intermediate colours are interpolated. All colours are independent except green; this control acts as a global hue rotate.

Using External LUTs



Press the *external* box and choose the LUT from the scroll box list on the right.

Unless the target folder has been changed via the *UI – Active Cube Folder* setting in the <F1> Configuration Window, 1D LUTs are located in the C:\Data\User\Luts folder; 3D LUTs are in the C:\Data\User\Cubes folder.

See 'Applying Colour Cubes' in chapter 1 for full details of setting a target folder, plus creating then using pre-process or output cubes.

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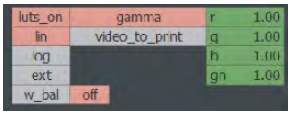
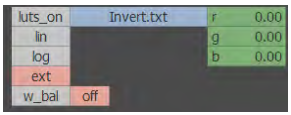
Global RGB Gamma Tables



With either the *internal* or *external* menu displayed, the colour adjusted data is linked into three independent tables on the right of the menu area to allow gamma correction.



With the *luts on* box on the right selected, any LUT can be loaded using values calculated by the platform (accessed by the *lin* and *log* boxes), or press *ext* then use the scroll box to use an external LUT.

Preset options are described below and in each case red, green, blue and gain can be controlled:

lin (linear) — A straight through mode; the gamma value has no effect.

log to print — Image clips held as 10 bit log data representing the full range of the scanned negative can be viewed in a print representation in this mode.

The output tables are loaded with a mathematical model of a typically processed print. The green numeric boxes in this case represent printer lights and provide an adjustment of +/- 30 (1.25 stops) from a lab nominal value.

video to print — The output tables are loaded with a soft start and end to give a representation of the look video data will generate when output to film.

The values in green numeric boxes give some simulation of printer light controls but these cannot be as accurate as for the 'log to print' tables because the user set-ups for this vary between installations.

viper — The Thompson Viper camera produces a log style output which is uncorrected for grey balance and contrast. The three numeric values allow you to set-up the grey balance and relative gain between the R, G and B channels.

w bal — With this box on, green numeric boxes control the setting of white balance. These can be used when viewing multiple versions of the image (eg for output to film and for reproduction on television) to match the look of film dye colours and television phosphor colours.

Control Sequence

The logical sequence for setting LUT values is as follows:

1. Modify the gamma tables to provide the appropriate rendition using a monochrome image.
2. Modify the green hue control to balance the green shades.
3. Modify the remaining controls.
4. Save the results for future use. Note that there are separate settings for HD and SD values.

User gamma tables can be defined and loaded automatically to replace the manual controls on system start-up. The format of the file is shown at the end of this chapter ('1D LUT Example') and comprises 9 bit input (512 values) of 8 bits each packed into 16 bit words saved in text files (.txt) in the C:\Data\User\Luts or C:\Data\User\Cubes folder.

Saving & Loading Settings

A maximum of 8 sets of menu settings can be stored for HD video and up to 8 for SD video; these are selected from the blue scroll box on the left of the menu area.

Press *save* to save the current menu settings to the selected set-up. The *load* box loads the settings from the selected set-up to the menu. The *reset* box resets the current menu settings. Note that selecting HD or SD from the blue box on the Application Bar automatically selects the HD or SD set of menu settings.

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1D LUT Example

A simple 1D LUT could adopt the following form:

```
table type   2
gMax 511
gSize 512

# lut file data v2 17/11/2003
# input starting at black and ending at white
#gamma
#r      g      b
511     511    511
510     510    510
509     509    509
508     508    508
507     507    507
506     506    506
505     505    505
“       “      “
“       “      “
5       5      5
4       4      4
3       3      3
2       2      2
1       1      1
0       0      0
```

Appendix

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Note that main entries starting with a lower case letter may indicate a sub-menu or panel function (eg **hue**).

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